

PSI2662 – Projeto em Sistemas Eletrônicos Embarcados: Sensores e Atuadores

Conversor Analógico-Digital - ADC

Escola Politécnica da Universidade de São Paulo

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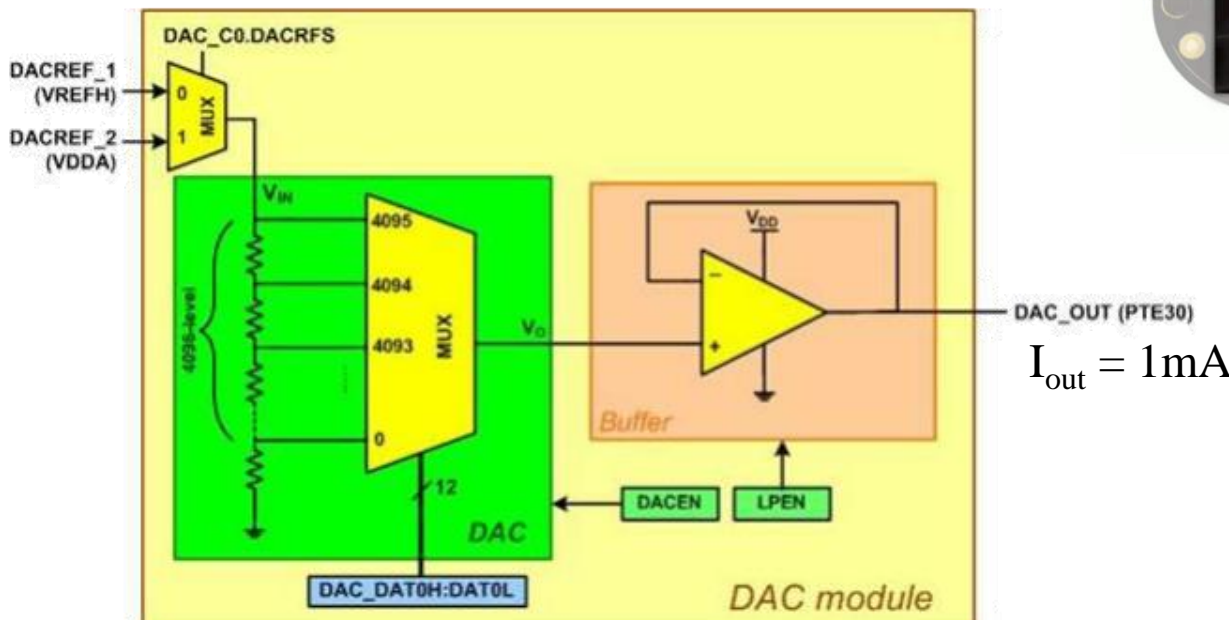
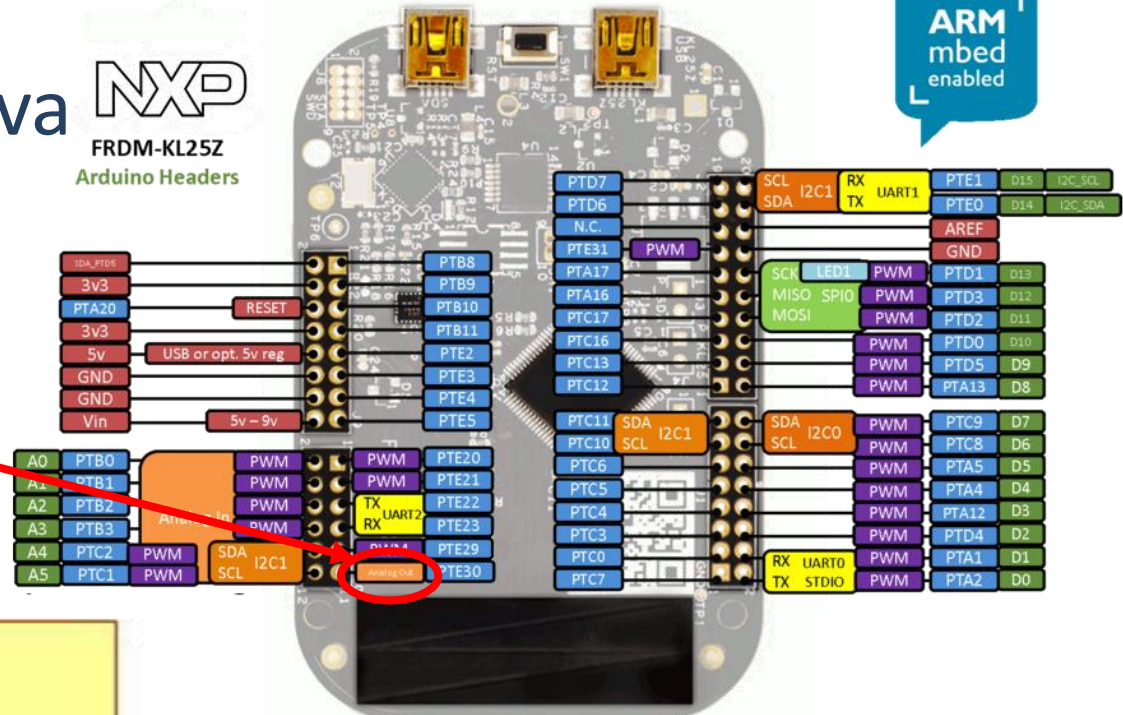
Segundo Semestre de 2015



DAC no KL25Z

- DAC com rede resistiva
- 12 bits
- 1 canal

NXP
FRDM-KL25Z
Arduino Headers





Configuração no CodeWarrior com PE

1) Adicionar o componente DAC

The screenshot shows the CodeWarrior Development Studio interface. The main window displays the 'Component Inspector - DA1' and 'Components Library' tabs. The 'Components Library' tab is active, showing a list of components with their levels. The 'DAC' component is highlighted, and a context menu is open over it, with 'Add to project' selected.

Component	Component Level
BootLoaderDisk	High
BootLoaderUSB	Low
BytelO	High
Capture	Low
Capture_LDD	Logical Device Dr...
ChLCD	Low
ConsoleIO	High
CriticalSection	Low
CTouchScanner	High
CTouchSensor	Low
DAC	High
DAC_LDD	Logical Device Dr...
DCF7	Dr...
DMA	Dr...
DMA0	Dr...
DMA1	Dr...
DS18B	Dr...
Event	F5 Dr...
Event	Delete

The context menu for the DAC component includes the following options:

- Add to project
- Add to project with Wizard
- Expand all
- Collapse all
- Refresh
- Delete
- Help on Component
- Profile As
- Resource Configurations

The 'Commander' window on the left shows the 'Build/Debug' section with options: Build (All), Clean (All), and Debug.

The 'Problems' window at the bottom shows: 0 errors, 2 warnings, 0 others.

Configuração no CodeWarrior com PE

2) Configurar o componente

CodeWarrior Development Studio interface showing the configuration of the DA1 component. The Component Inspector displays the following properties:

Name	Value	Details
Component name	DA1	
D/A converter	DAC0	DAC0
Interrupt service/event	Disabled	
Output pin	yes	
D/A channel (pin)	DAC0_OUT/ADC0_SE23/CMP0_IN4/PTE30/TPM0_CH3/TPM_CLKIN1	DAC0_OUT/ADC0_SE23/CMP0_IN4/PTE30/TPM0_CH3/TPM_CLKIN1
D/A channel (pin) signal		
Init value	0	D
D/A resolution	Autoselect	12 bits
Data mode	unsigned 16 bits, right justified	
Low power mode	Disabled	
Voltage reference source	internal	Vref0
Hardware buffer	Disabled	
DMA	Disabled	
Initialization		
Enabled in init. code	yes	
Auto initialization	yes	
Event mask		
CPU clock/configuration selection		

Annotations in the image:

- Só tem um pino**: A red arrow points to the 'D/A channel (pin)' value.
- Habilitar**: A red arrow points to the 'Enabled in init. code' property under the 'Initialization' section.

Configuração no CodeWarrior com PE

3) Gerar o código do PE

The screenshot displays the CodeWarrior IDE interface. The main window is titled '*Component Inspector - DA1' and shows the 'Properties' tab for a DAC component. A red arrow points from the 'Generate Processor Expert Code' button in the 'Components - ADC' panel to the 'Generate Processor Expert Code' button in the 'Component Inspector' window.

The 'Component Inspector' window shows the following properties:

Name	Value	Details
Component name	DA1	
D/A converter	DAC0	DAC0
Interrupt service/event	Disabled	
Output pin	yes	
D/A channel (pin)	DAC0_OUT/ADC0_SE23/CMP0_IN4/PTE30/TPM0_CH3/TPM_CLKIN1	DAC0_OUT/ADC0_SE23/CMP0_IN4/PTE30/TPM0_CH3/TPM_CLKIN1
D/A channel (pin) signal		
Init value	0	D
D/A resolution	Autoselect	12 bits
Data mode	unsigned 16 bits, right justified	
Low power mode	Disabled	
Voltage reference source	internal	Vref0
Variable buffer	Disabled	
DMA	Disabled	
Initialization		
Enabled in init. code	yes	
Auto initialization	yes	
Event mask		
CPU clock/configuration selection		

The 'Commander' window shows the 'Build/Debug' menu with options: Build (All), Clean (All), and Debug.

The 'main.c' editor shows the following code:

```
/* Write your code here */  
/* For example: for(;;) { } */
```

The 'Problems' window shows 0 errors, 2 warnings, and 0 others.

Configuração no CodeWarrior com PE

3) Escreva o código no lugar apropriado

C/C++ - ADC/Sources/main.c - CodeWarrior Development Studio

File Edit Source Refactor Search Project MQX Tools Processor Expert Run Window Help

CodeWarrior Projects

- ADC : FLASH
- Freedom_DAC : FLASH
- ki25z : FLASH
 - sem PE
 - teste

Components - ADC

- Generator_Configurations
 - FLASH
- OSs
- Processors
 - Cpu:MKL25Z128VLK4
- Components
 - Referenced_Components
 - AD1:ADC
 - DA1:DAC_LDD
 - PDD

Component Inspector - DA1

Name	Value	Details
Component name	DA1	

```
/* Write your local variable definition here */
int out = 1241; /* equivalente a 1,0 V no pino PTE30 - 3,3 V / 4096 = 0,806 mV por degrau */

/** Processor Expert internal initialization. DON'T REMOVE THIS CODE!!! */
PE_low_level_init();
/** End of Processor Expert internal initialization. */

/* Write your code here */
/* For example: for(;;) ( ) */
for(;;) {

    DA1_SetValue(DA1_DeviceData, out);
}

/** Don't write any code past this line, or it will be deleted during code generation. */
```

Problems Console Progress Memory

Description	Resource	Path	Location	Type
0 items				

Writable | Smart Insert | 65 : 3



código

```
int out = 1241; /* equivalente a 1,0 V no pino PTE30 - 3,3 V / 4096 = 0,806  
mV por degrau */
```

```
for(;;) {  
    DA1_SetValue(DA1_DeviceData, out);  
}
```