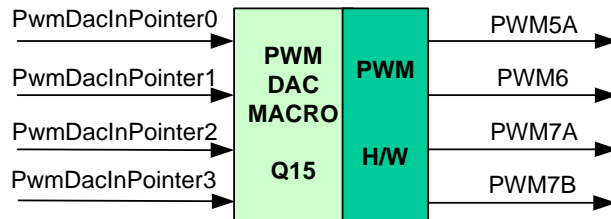


**Description**

This module converts any s/w variables with Q15 representation into the PWM signals in EPWM5-7 for 2803x. Thus, it can be used to view the signal, represented by the variable, at the outputs of the PWM5, PWM6, PWM7 pins through the external low-pass filters.

**Availability**

This 16-bit module is available in one interface format:

- 1) The C interface version

**Module Properties**

**Type:** Target Dependent, Application Independent

**Target Devices:** 28x Fixed Point or PiccoloB

**C Version File Names:** f2803xpwm dac.h (for x2803x)

**IQmath library files for C:** N/A

**C Interface****Object Definition**

The structure of PWMDAC object is defined by following structure definition

```
typedef struct {  
    int16 *PwmDacInPointer0; // Input: Pointer to source data output on PWMDAC ch 0  
    int16 *PwmDacInPointer1; // Input: Pointer to source data output on PWMDAC ch 1  
    int16 *PwmDacInPointer2; // Input: Pointer to source data output on PWMDAC ch 2  
    Uint16 PeriodMax;        // Parameter: PWMDAC half period in number of clocks (Q0)  
} PWMDAC;
```

```
typedef PWMDAC *PWMDAC_handle;
```

Item	Name	Description	Format	Range(Hex)
<b>Inputs</b>	PwmDacInPointer (x=0,1,2)	These input variables contain the addresses of the desired s/w variables.	N/A	N/A
<b>Outputs</b>	PWMx (x=5,6,7)	Output signals from the PWM 5-7 pins in	N/A	0-3.3 V
<b>PWMDAC parameter</b>	PeriodMax	PWMDAC half period in number of clocks	Q0	8000-7FFF

**Special Constants and Data types****PWMDAC**

The module definition is created as a data type. This makes it convenient to instance an interface to the PWMDAC driver. To create multiple instances of the module simply declare variables of type PWMDAC.

**PWMDAC\_handle**

User defined Data type of pointer to PWMDAC module

**PWMDAC\_DEFAULTS**

Structure symbolic constant to initialize PWMDAC module. This provides the initial values to the terminal variables as well as method pointers.

**Methods**

```
PWMDAC_INIT_MACRO (PWMDAC *);  
PWMDAC_MACRO (PWMDAC *);
```

---

This default definition of the object implements two methods – the initialization and the runtime compute macro for PWMDAC generation. This is implemented by means of a macro pointer, and the initializer sets this to PWMDAC\_INIT\_MACRO and PWMDAC\_MACRO macros for x280x. The argument to this macro is the address of the PWMDAC object.

## Module Usage

### Instantiation

The following example instances one PWMDAC object  
PWMDAC pwmdac1;

### Initialization

To Instance pre-initialized objects  
PWMDAC pwmdac1 = PWMDAC\_DEFAULTS;

### Invoking the computation macro

PWMDAC\_INIT\_MACRO(pwmdac1);  
PWMDAC\_MACRO(pwmdac1);

## Example

The following pseudo code provides the information about the module usage.

```
main()
{
    pwmdac1.PeriodMax = 2500;    // PWM frequency = 30 kHz, clock = 150 MHz
    pwmdac1.PwmDacInPointer0= &pwmdac_ch1_Q15;
    pwmdac1.PwmDacInPointer1= &pwmdac_ch2_Q15;
    pwmdac1.PwmDacInPointer2= &pwmdac_ch3_Q15;
    pwmdac1.PwmDacInPointer3= &pwmdac_ch4_Q15;

    PWMDAC_INIT_MACRO (pwmdac1);    // Call init macro for pwmdac1
}

void interrupt periodic_interrupt_isr()
{
    pwmdac_ch1_Q15 = (int)_IQtoIQ15(variable1_in_IQ);
    pwmdac_ch2_Q15 = (int)_IQtoIQ15(variable2_in_IQ);
    pwmdac_ch3_Q15 = (int)_IQtoIQ15(variable3_in_IQ);
    pwmdac_ch4_Q15 = (int)_IQtoIQ15(variable4_in_IQ);

    PWMDAC_MACRO(pwmdac1); // Call update macro for pwmdac1
}
```

## Technical Background

This module converts any s/w variables with Q15 representation into the PWM signals in 280x devices. The EPWM5-7 will be used. Therefore, the external low-pass filters are necessary to view the actual signal waveforms as seen in Figure 1. The (1<sup>st</sup>-order) RC low-pass filter can be simply used to filter out the high frequency component embedded in the actual low frequency signals. To select R and C values, its time constant can be expressed in term of cut-off frequency ( $f_c$ ) as follow:

$$\tau = RC = \frac{1}{2\pi f_c} \quad (1)$$

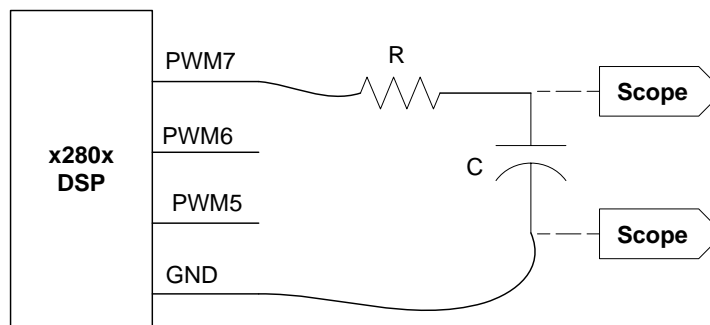


Figure 1: External RC low-pass filter connecting to PWM7 pin in x280x DSP