

DO-PWM - Direct output PWM

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The Direct output PWM block sets PWM output(s) directly to '0' or '1'.

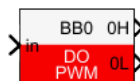
This technique is typically used for [Model Predictive Control \(TN162\)](#) or [Direct Torque Control \(AN004\)](#).

Like the other PWM blocks, the Direct output PWM block supports **dead-time generation** and can be **activated or deactivated**. More information is available on the [PWM page](#).

Simulink block

Signal specification

- The input `in` sets the PWM output to '1' (`in>0`) or to '0' (`in<=0`)
- The input `A` allows the activation (`>0`) or deactivation (`<=0`) of the PWM output(s).
- The output(s) is/are the generated PWM signal(s), according to the selected output `mode`. The output(s) is/are only used in simulation.



Parameters

- Device `ID` selects which B-Box/B-Board to address when used in a multi-device configuration.
- Output `mode` selects between a single PWM signal or complementary signals with a dead-time.
- Addressed `channel(s)` or Addressed `lane(s)` (vectorizable) selects the PWM outputs to address.
- Show "activate" input makes the `A` signal input visible. If not checked, the block is active by default.
- Dead-time `duration`: configures the dead-time duration if the Output `mode` is set at *Dual* ($PWM_H + PWM_L$).

The parameters output `mode`, addressed `PWM`, dead-time and show "activate" input are common to all PWM blocks and are further documented on the [PWM page](#).

Block Parameters: PWM_DO

Direct Output PWM
Sets a PWM output directly, right after the interrupt execution, without modulation.

- The input 'in' sets the PWM output to '1' (in>0) or to '0' (in<=0).
- The input signal 'A' allows the activation (1) or deactivation (0) of the PWM output(s).

Addressing

Device ID (default=0)

Output mode

Addressed channel(s)

A channel **i** corresponds to the lanes **2i** and **2i+1**.

Block parameters **Complementary signal parameters**

PWM activation

☒ Show "activate" input

OK **Cancel** **Help** **Apply**

Block Parameters: PWM_DO

Direct Output PWM
Sets a PWM output directly, right after the interrupt execution, without modulation.

- The input 'in' sets the PWM output to '1' (in>0) or to '0' (in<=0).
- The input signal 'A' allows the activation (1) or deactivation (0) of the PWM output(s).

Addressing

Device ID (default=0)

Output mode

Addressed channel(s)

A channel **i** corresponds to the lanes **2i** and **2i+1**.

Block parameters **Complementary signal parameters**

Dead-time generation

Dead-time duration (in seconds)

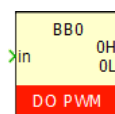
☐ Simulate dead-time

OK **Cancel** **Help** **Apply**

PLECS block

Signal specification

- The input **in** sets the PWM output to '1' (in>0) or to '0' (in<=0)
- The input **A** allows the activation (A>0) or deactivation (A<=0) of the PWM output(s).
- The target output(s) (only visible at the atomic subsystem level) is/are the generated PWM signal(s), according to the selected output mode. The output(s) is/are only used in simulation.



Parameters

- Device ID selects which B-Box/B-Board to address when used in a multi-device configuration.

- Output mode selects between a single PWM signal or complementary signals with a deadtime.
- Output lane(s) or Output channel(s) (vectorizable) selects the PWM outputs to address.
- PWM activation makes the A signal input visible if the option “Use block input” is selected. If not, the CB-PWM block is activated by default.
- Dead-time duration configures the dead-time duration if the Output mode is set at Dual (PWM_H + PWM_L).

The parameters output mode, addressed PWM, dead time and PWM activation are common to all PWM blocks and are further documented on the [PWM page](#).

The image shows three sequential screenshots of a software configuration dialog box titled "Block Parameters: imperix_template/Imperix controller/Subsy...".

- First Screenshot (Addressing tab):** Shows fields for "Device ID [default=0]" (set to 0), "Output mode" (set to "Dual (PWM_H + PWM_L)"), and "Output channel(s) [0 to 15]" (set to 0). Each field has a checkbox to its right.
- Second Screenshot (Modulation parameters tab):** Shows the "PWM activation" dropdown menu set to "Use block input".
- Third Screenshot (Complementary signal parameters tab):** Shows the "Dead-time duration [in seconds]" field set to "1e-6".

Each screenshot includes an "OK" button (highlighted with a blue border), "Cancel", "Apply", and "Help" buttons at the bottom.

C++ functions

Functions specific to the direct-output PWM

DoPwm_SetOn — Set the PWM output to '1'

```
void DoPwm_SetOn(tPwmOutput output, unsigned int device=0);
```

Code language: C++ (cpp)

Sets the PWM output to '1'.

Parameters

- output: the PWM channel or lane to address
- device: the id of the addressed device (optional, used in multi-device configuration only)

DoPwm_SetOff — Set the PWM output to '0'

```
void DoPwm_SetOff(tPwmOutput output, unsigned int device=0);
```

Code language: C++ (cpp)

Sets the PWM output to '0'.

Parameters

- output: the PWM channel or lane to address
- device: the id of the addressed device (optional, used in multi-device configuration only)

Functions common to all PWM drivers

These functions are common to all PWM blocks. Further documentation is available on the [PWM page](#).

DoPwm_ConfigureOutputMode — Select the PWM output mode

```
void DoPwm_ConfigureOutputMode(tPwmOutput output, tPwmOutMode outMode, unsigned int device=0);
```

Code language: C++ (cpp)

Selects the PWM output mode.

If the output mode selected is *COMPLEMENTARY*, a dead-time must be configured using the `CbPwm_ConfigureDeadTime()` function.

It has to be called in `UserInit()`.

Parameters

- output: the PWM channel or lane to address
- outMode: the output mode to use (*COMPLEMENTARY*, *INDEPENDENT* or *PWMH_ACTIVE*)
- device: the B-Box/B-Board to address when used in a multi-device configuration

DoPwm_ConfigureDeadTime — Configure the dead time

```
void DoPwm_ConfigureDeadTime(tPwmOutput output, float deadTime, unsigned int device=0);
```

Code language: C++ (cpp)

Configures the dead-time duration if the output mode is set as *COMPLEMENTARY*.

It has to be called in `UserInit()`.

Parameters

- output: the PWM channel or lane to address
- outMode: the output mode to use (*COMPLEMENTARY*, *INDEPENDENT* or *PWMH_ACTIVE*)
- device: the B-Box/B-Board to address when used in a multi-device configuration

DoPwm_Activate — Activate the PWM outputs

```
void DoPwm_Activate(tPwmOutput output, unsigned int device=0);
```

Code language: C++ (cpp)

Activates the addressed PWM output(s). If the addressed PWM output has been set as *COMPLEMENTARY* or *PWMH_ACTIVE* this function acts on both outputs.

It can be called in `UserInit()` or in the control interrupt routine.

Parameters

- output: the PWM channel or lane to address
- device: the B-Box/B-Board to address when used in a multi-device configuration

DoPwm_Deactivate — Deactivate the PWM outputs

```
void DoPwm_Deactivate(tPwmOutput output, unsigned int device=0);
```

Code language: C++ (cpp)

Deactivates the addressed PWM output(s). If the addressed PWM output has been set as *COMPLEMENTARY* or *PWMH_ACTIVE* this function acts on both outputs.

It can be called in `UserInit()` or in the control interrupt routine.

Parameters

- output: the PWM channel or lane to address
- device: the B-Box/B-Board to address when used in a multi-device configuration