PWM - Pulse Width Modulators

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The Pulse Width Modulators (PWM) share the **dead-time generation** and the **activate/deactivate** features, configured through the `output mode`, `deadtime`, and `activate` parameters.

The said PWM blocks are:

- CB-PWM – Carrier-based PWM
- SV-PWM – Space vector PWM
- SS-PWM – Multilevel PWM with Sort-&-Select balancing
- PP-PWM – Programmed Patterns PWM
- DO-PWM – Direct output PWM
- SB-PWM – Sandbox PWM

Output mode parameter

The Pulse Width Modulators have three possible `output modes`:

- *Single*: the modulator provides a single PWM signal on the corresponding output which is referred to as a **lane (LN)**.
- *Dual (PWM_H + PWM_L)*: the modulator provides a pair of complementary signals (PWM high and PWM low) with dead time. A pair of complementary signals output is referred to as a **channel (CH)** and is constituted of adjacent

lanes. The odd lanes are always low-side signals, while even lanes are always high-side.

- *Dual (PWM_H + ACTIVE)*: in this mode, the PWM_L is replaced by the ACTIVE signal. The ACTIVE signal is 'on' if the PWM block is activated and PWM outputs are enabled (see `activate` parameter below).

Hardware configuration

The PWM lane and channel numbering are as illustrated below.

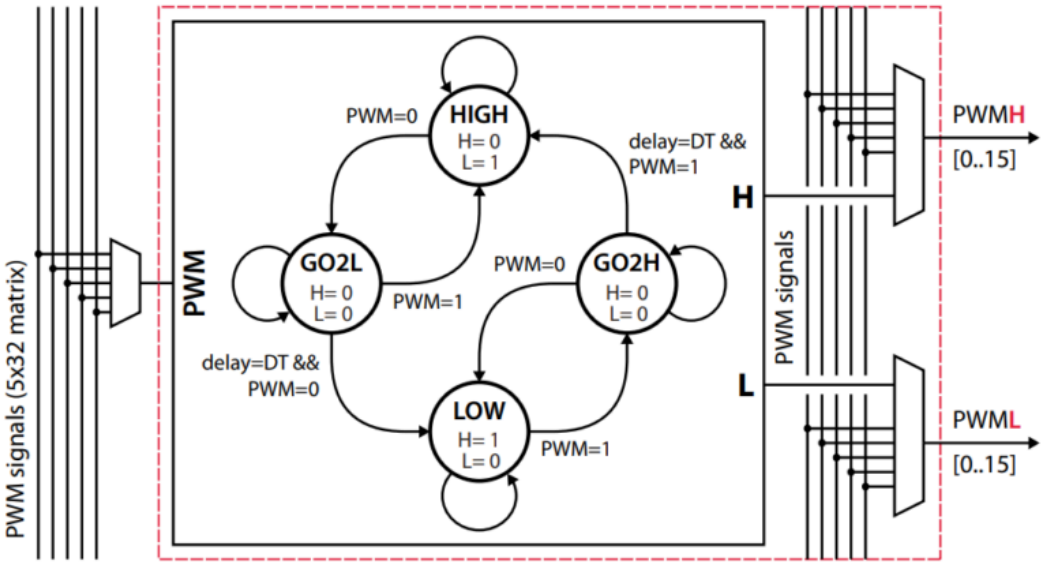
Channel	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Lane	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	H
	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	L
Optical																	
Electrical																	

On a B-Box RCP, the first height channels are output both optically (frontpanel) and electrically (backpannel C and D digital connectors). On a B-Board PRO, all channels are only electrical.

Please refer to the B-Box and the B-Board datasheets for more information.

Dead-time parameter

When the `output mode` is set as *Dual (PWM_H + PWM_L)* then a dead-time must be configured. The following figure taken from the B-Box datasheet shows the finite-state used to generate the complementary signals with dead-time.



Activate/deactivate parameter

Two conditions must be met for a signal to be outputted on a PWM output:

- The PWM outputs must be **enabled**. This condition is global to the system and can be controlled either from the Cockpit software or from the model using the Enable outputs block.
- The PWM outputs must be **activated**. The PWM outputs are activated by default but the user can choose to have an `activate` input signal to selectively activate or deactivate a PWM lane or channel during run-time.