

MODEL BASED DESIGN TOOLBOX ENABLING FAST PROTOTYPING AND DESIGN

- Define the commutation sectors
- Understand Hall sensors transitions
- Hall sensors pattern identification



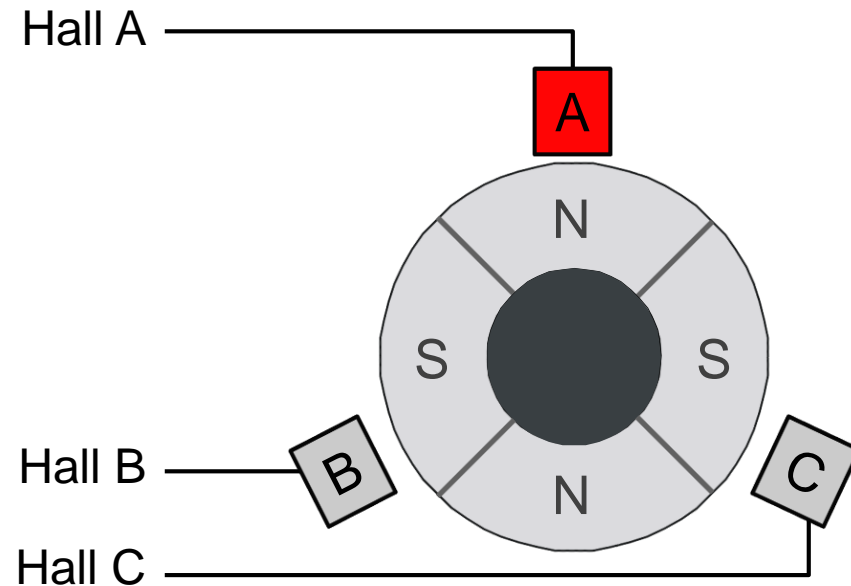
EXTERNAL USE



SECURE CONNECTIONS
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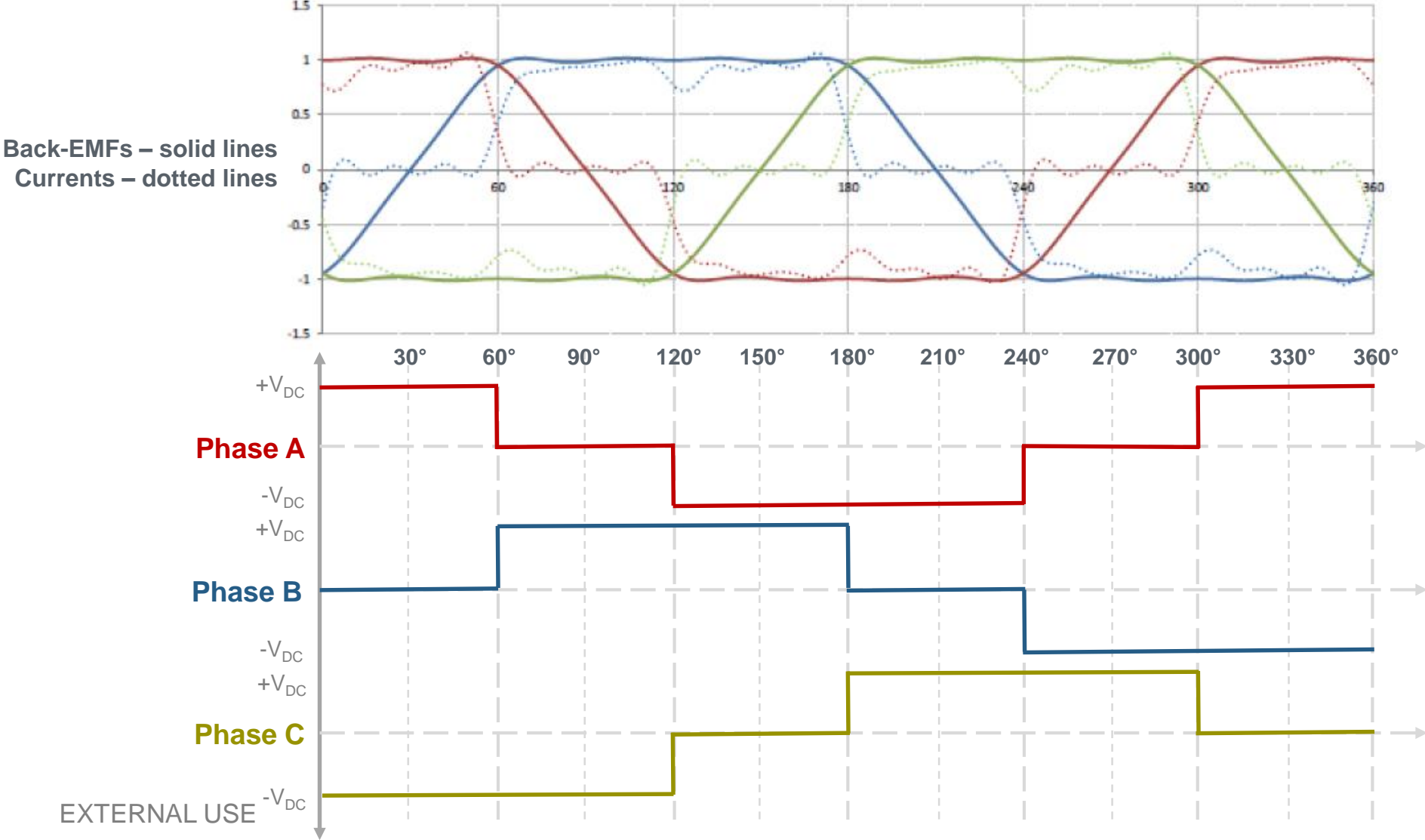
Rotor Position

- To commute correctly for trapezoidal control the rotor position is required.
- Rotor position information enables the Power Inverter to ensure proper direction of current flow through the phase windings.
- Each Hall sensor is placed 120 electrical degrees apart and delivers a “**high**”/“**1**” state when facing a “**north pole**” and a “**low**”/“**0**” state when facing a “**south pole**”.



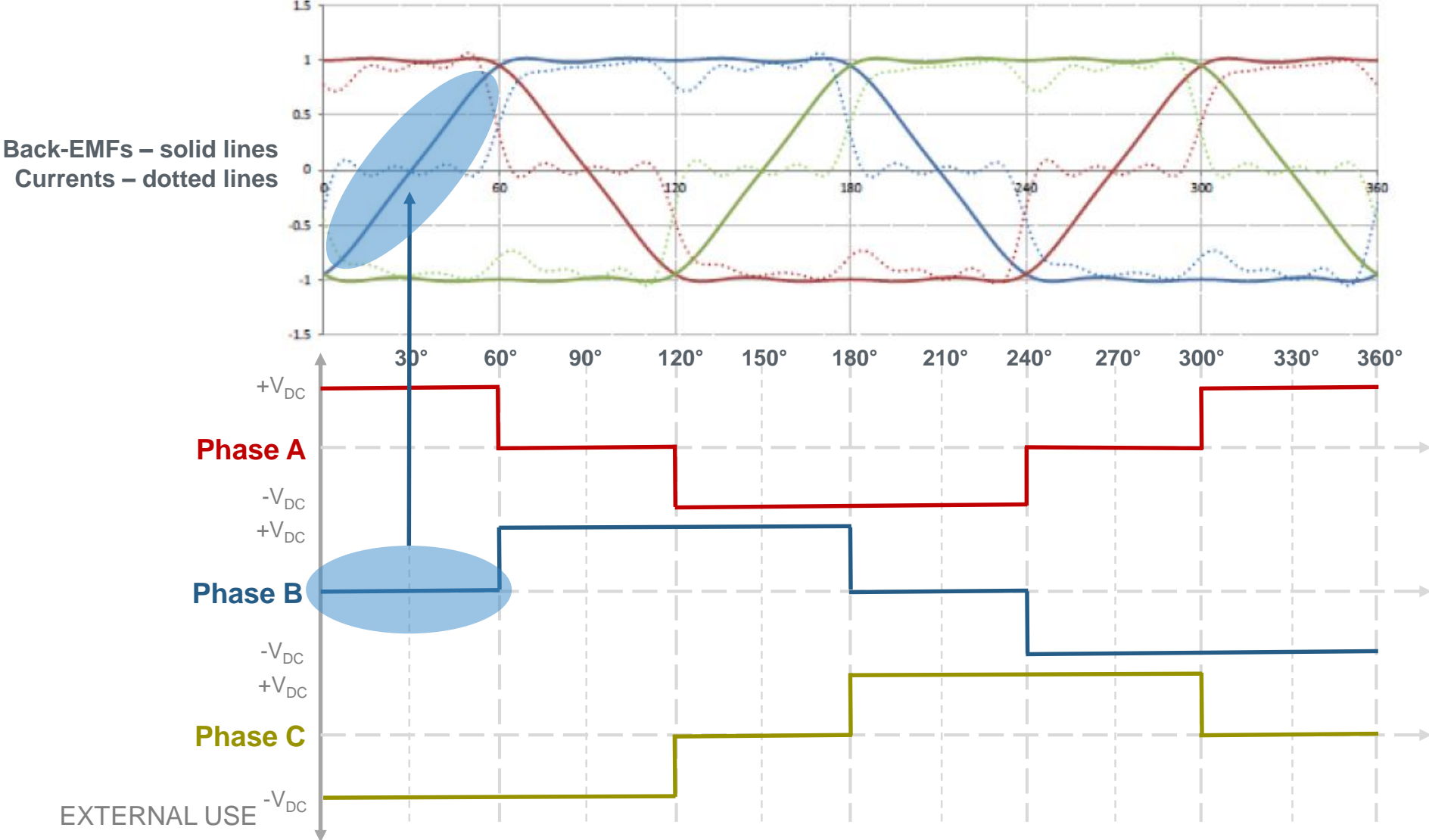
Commutation sectors

- Best way to drive the BLDC is to commute 2 out of 3 phases at each time



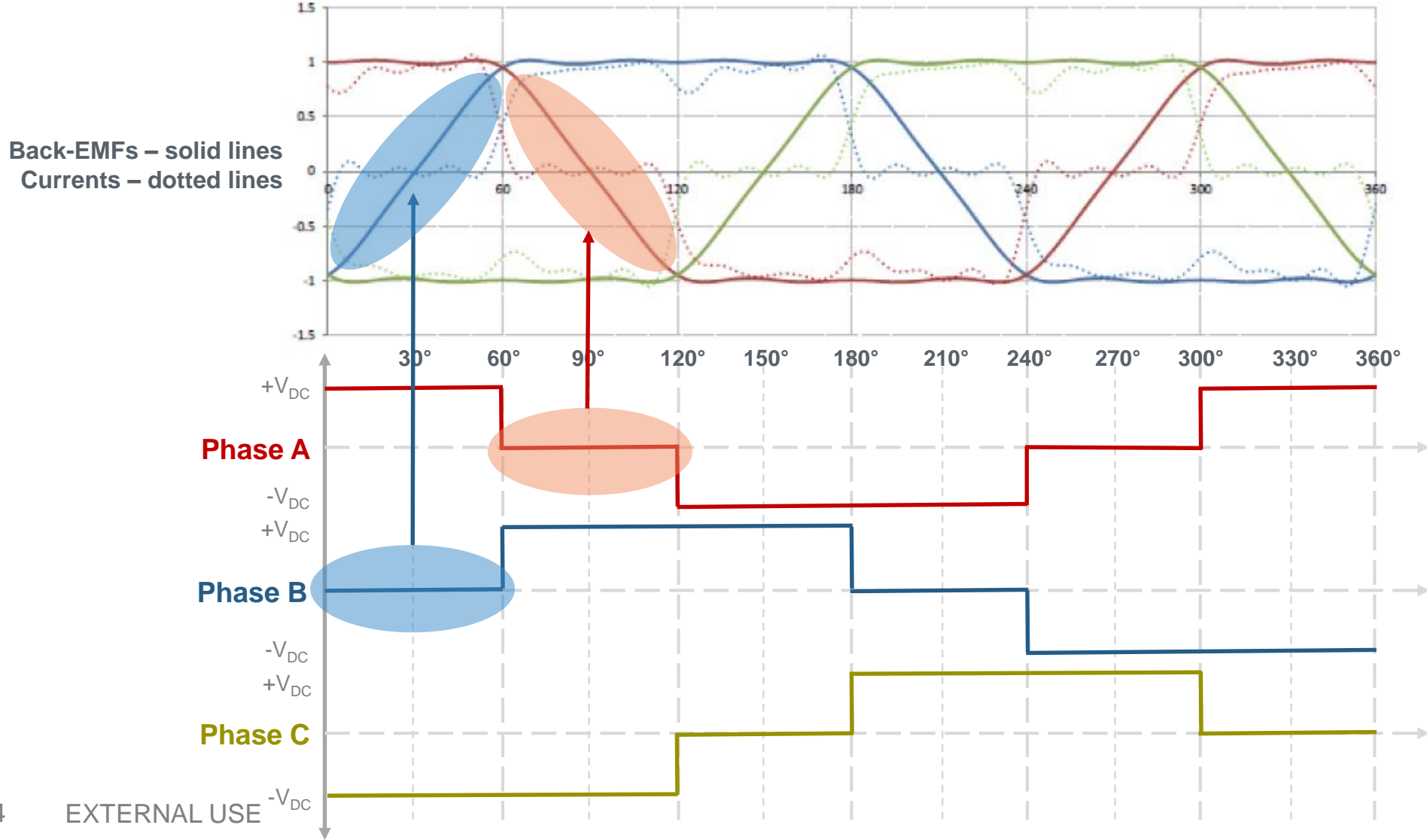
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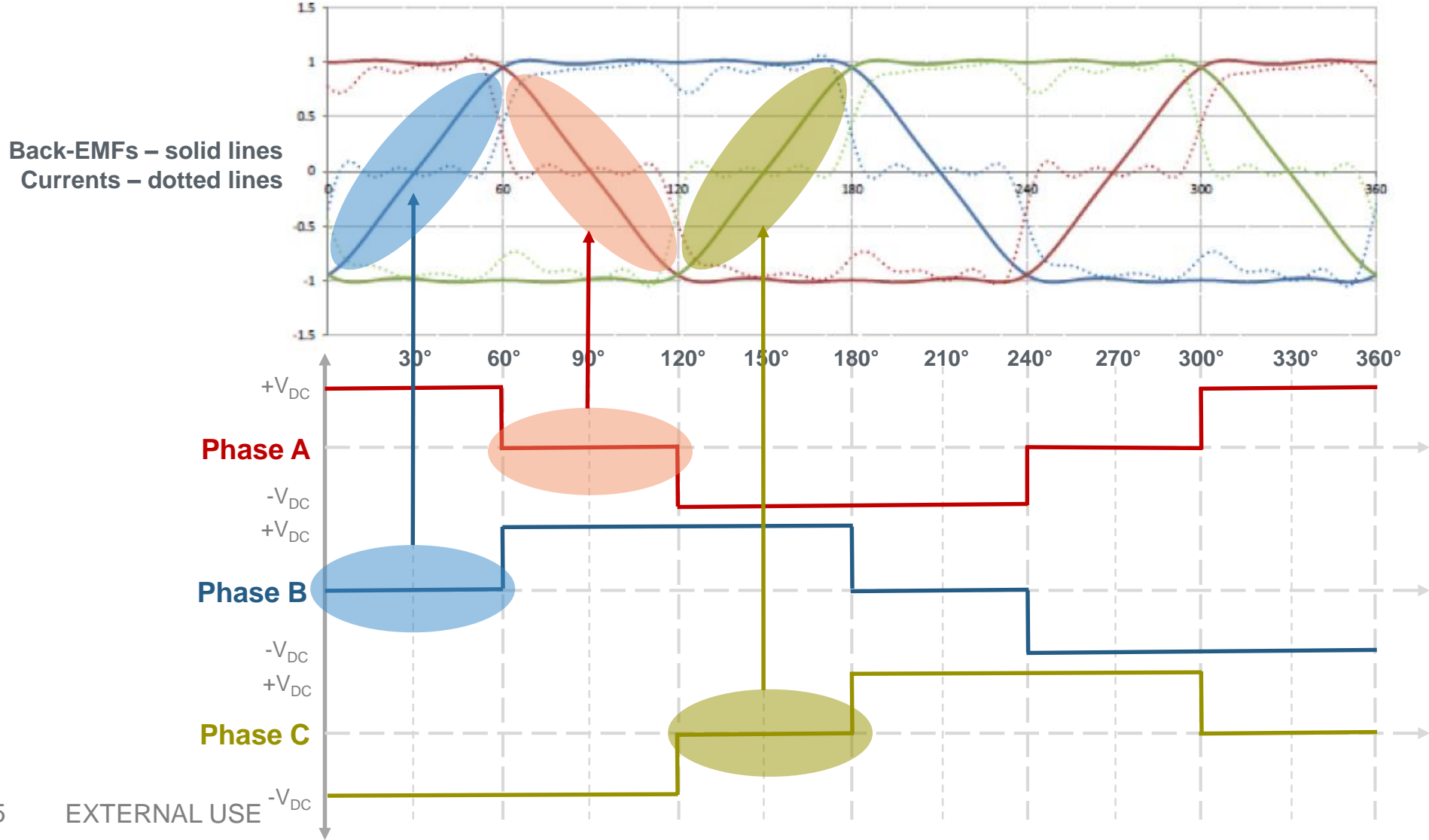
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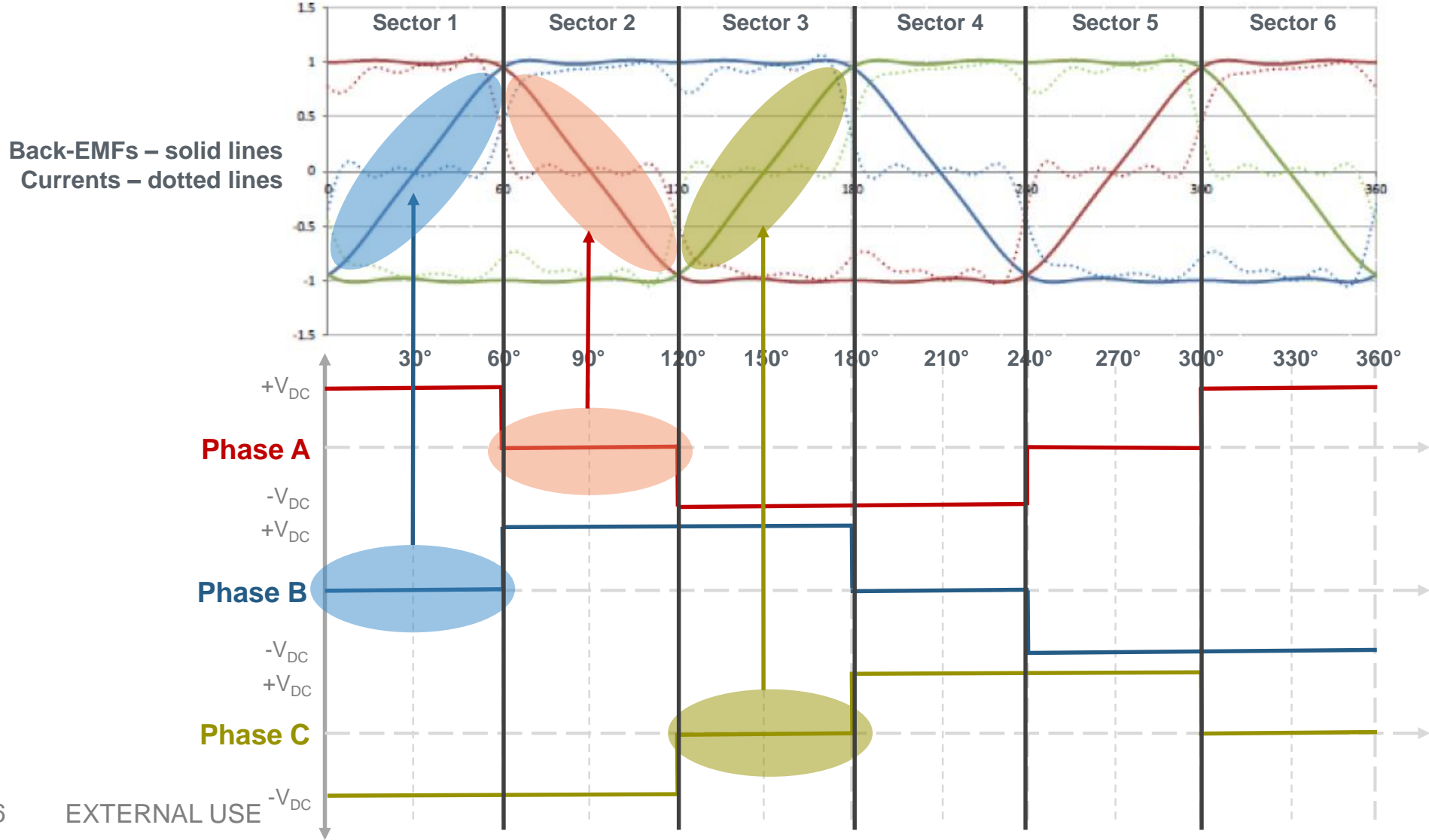
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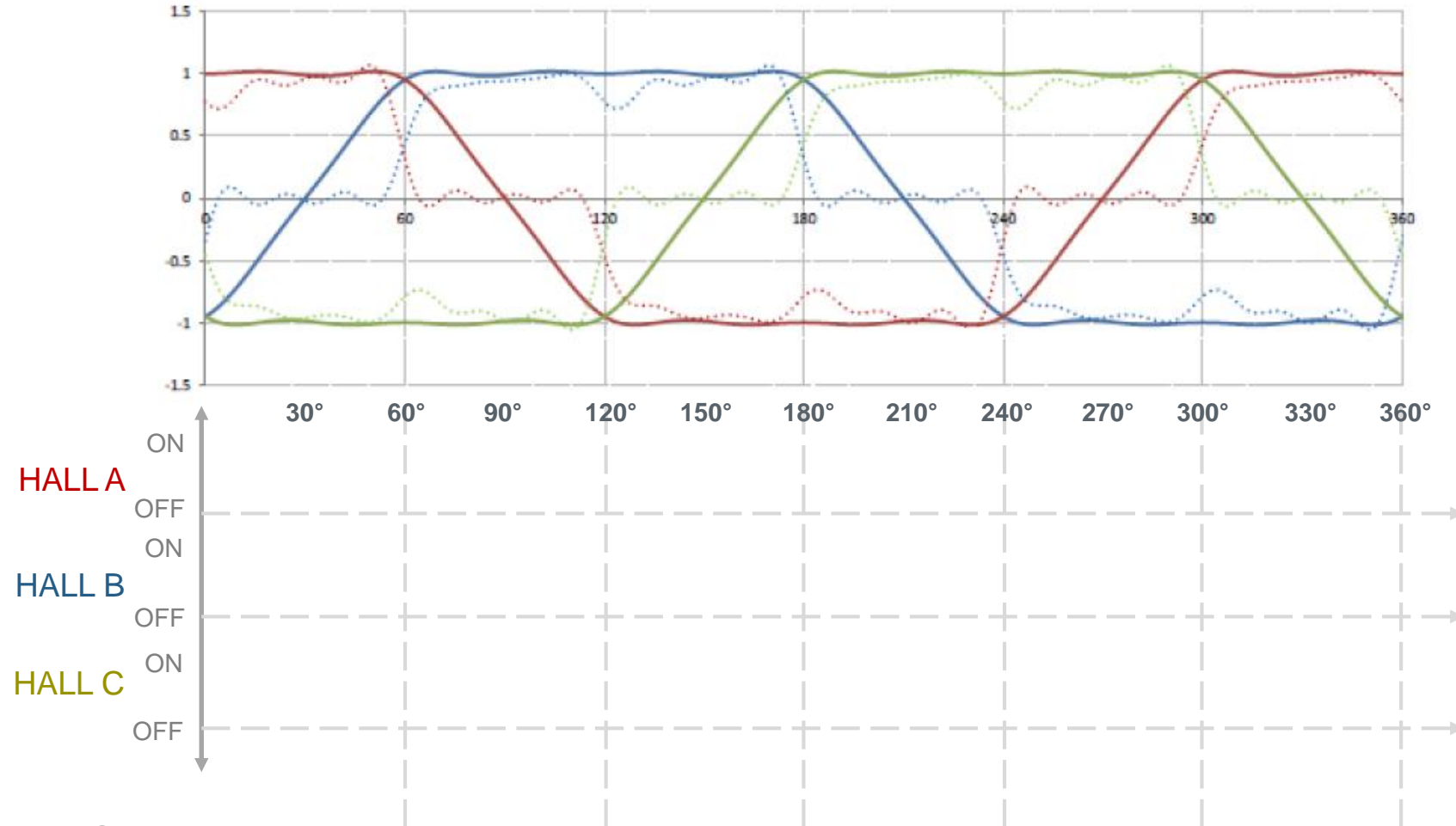
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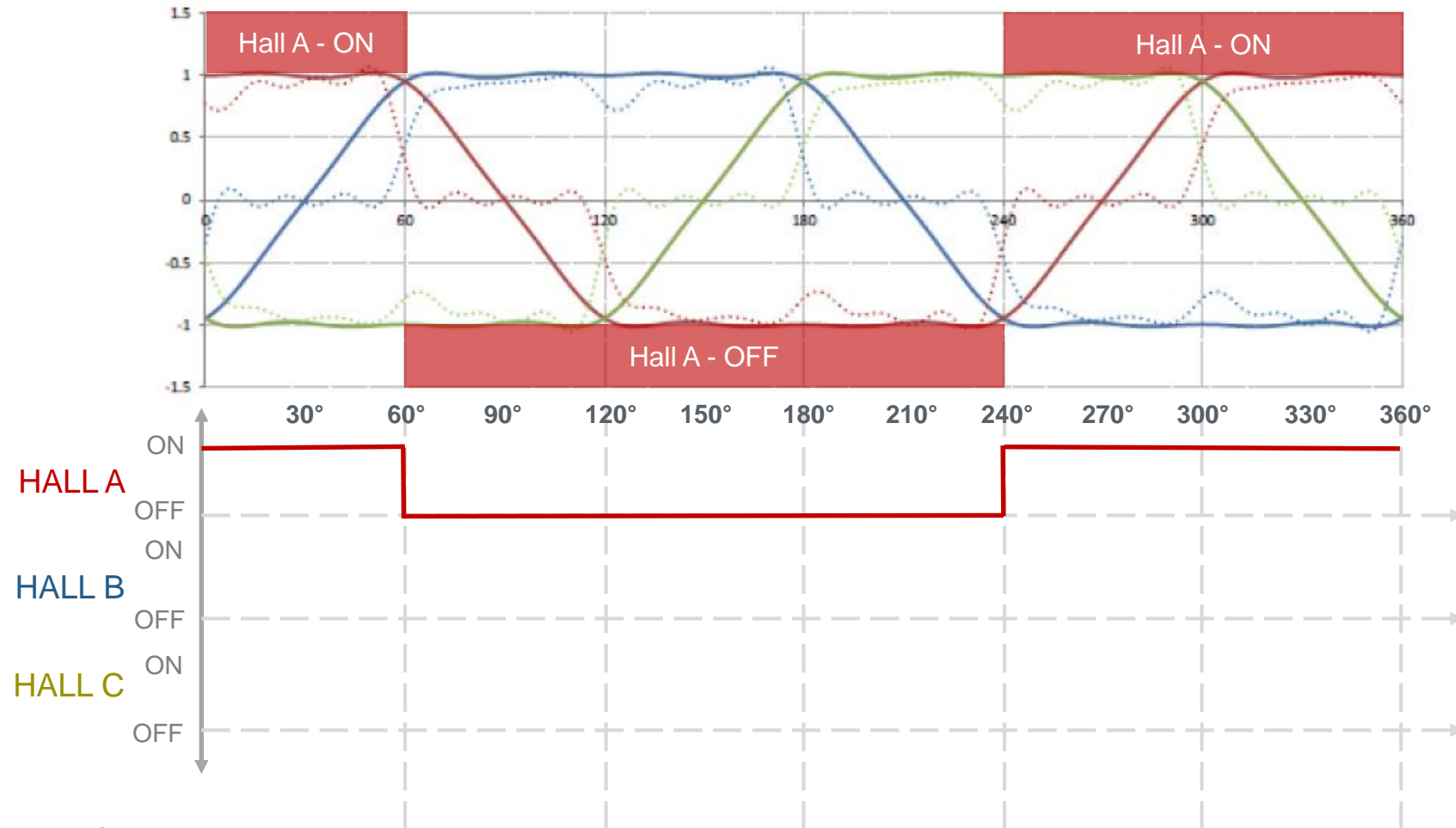
Hall sensors transitions

- Sensors are usually positioned so that the magnets change its values before the rotor is actually in the next commutation position
- Hall sensor is on or off for 180° electrical degrees alternatively



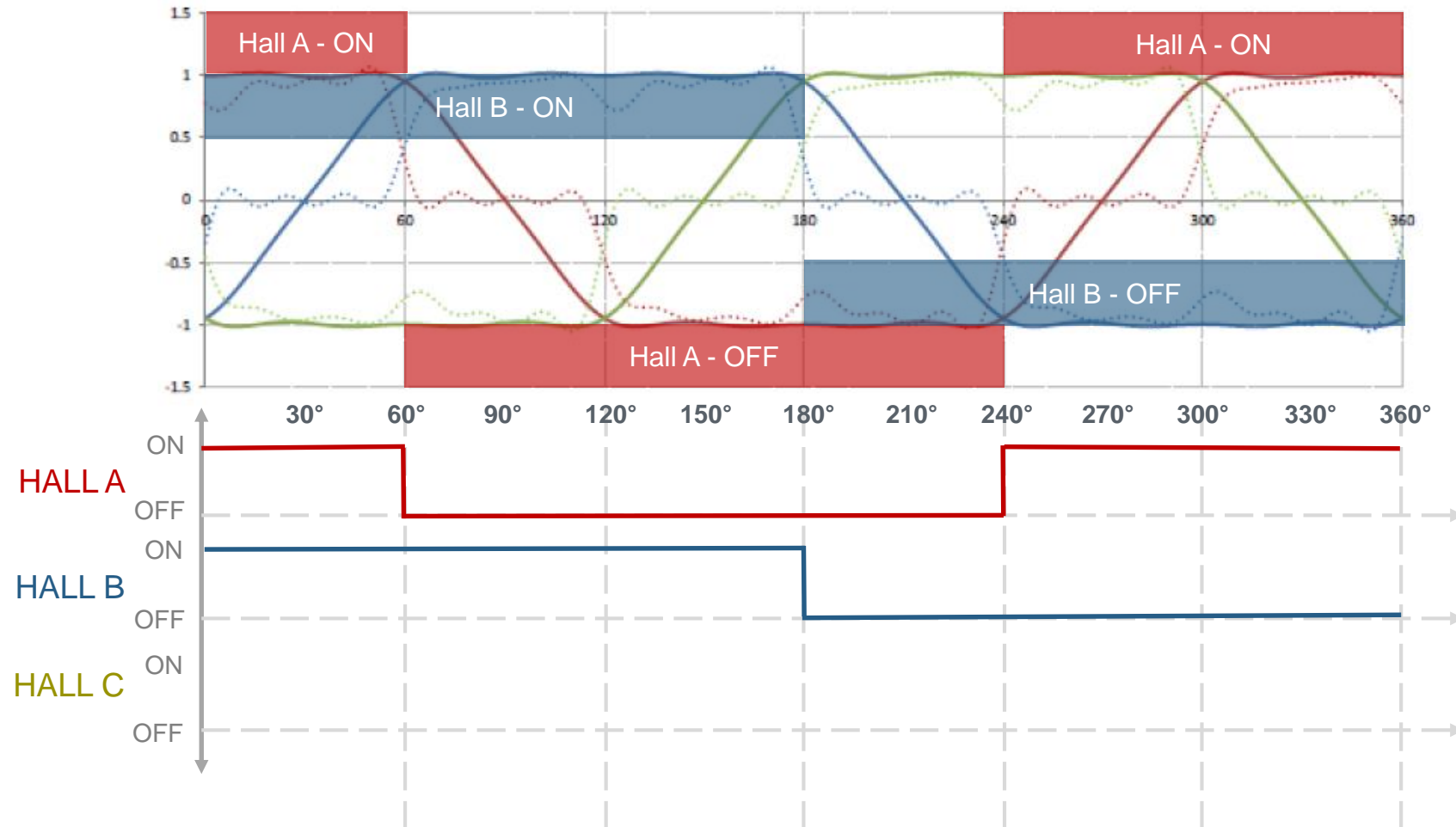
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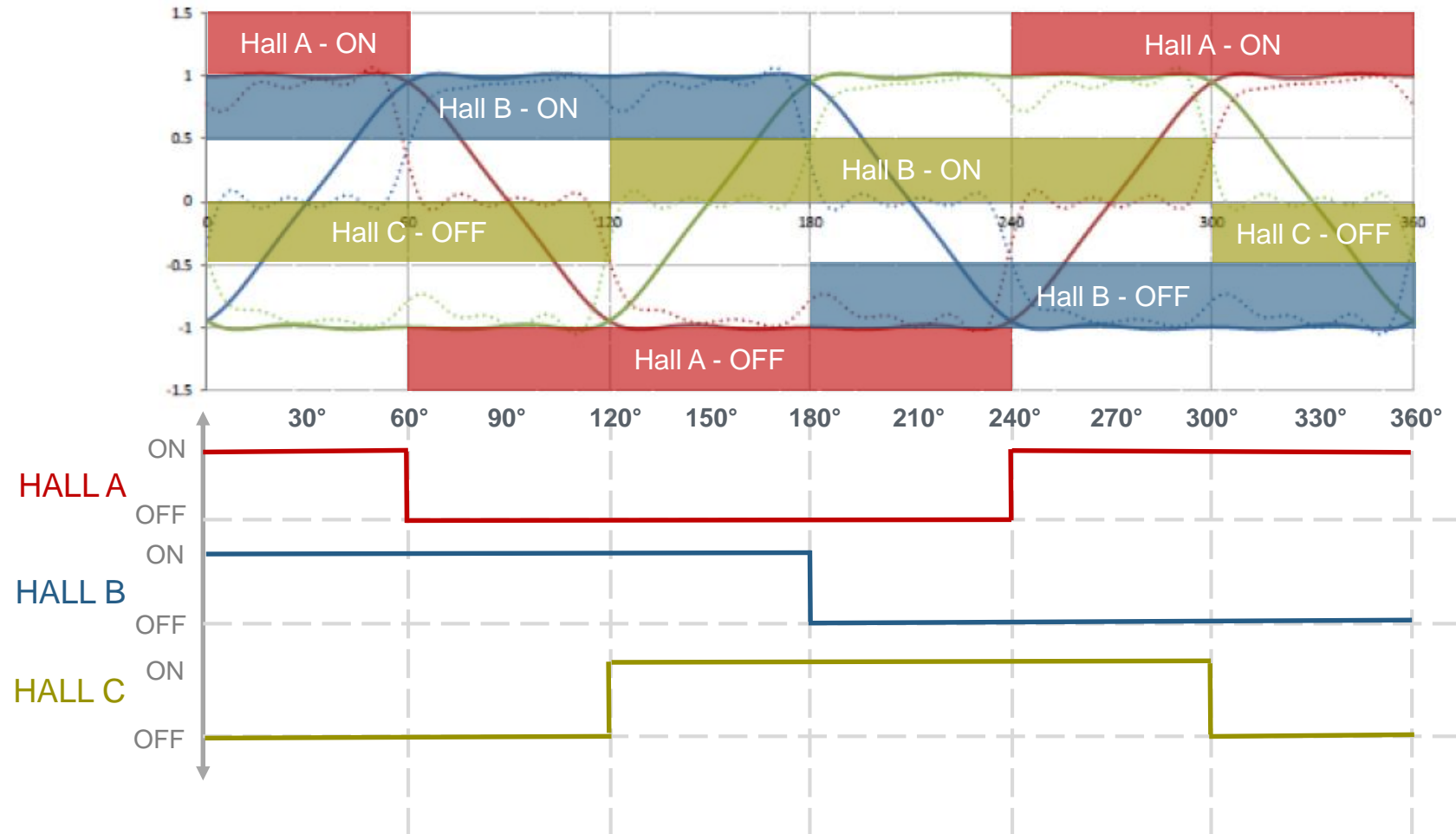
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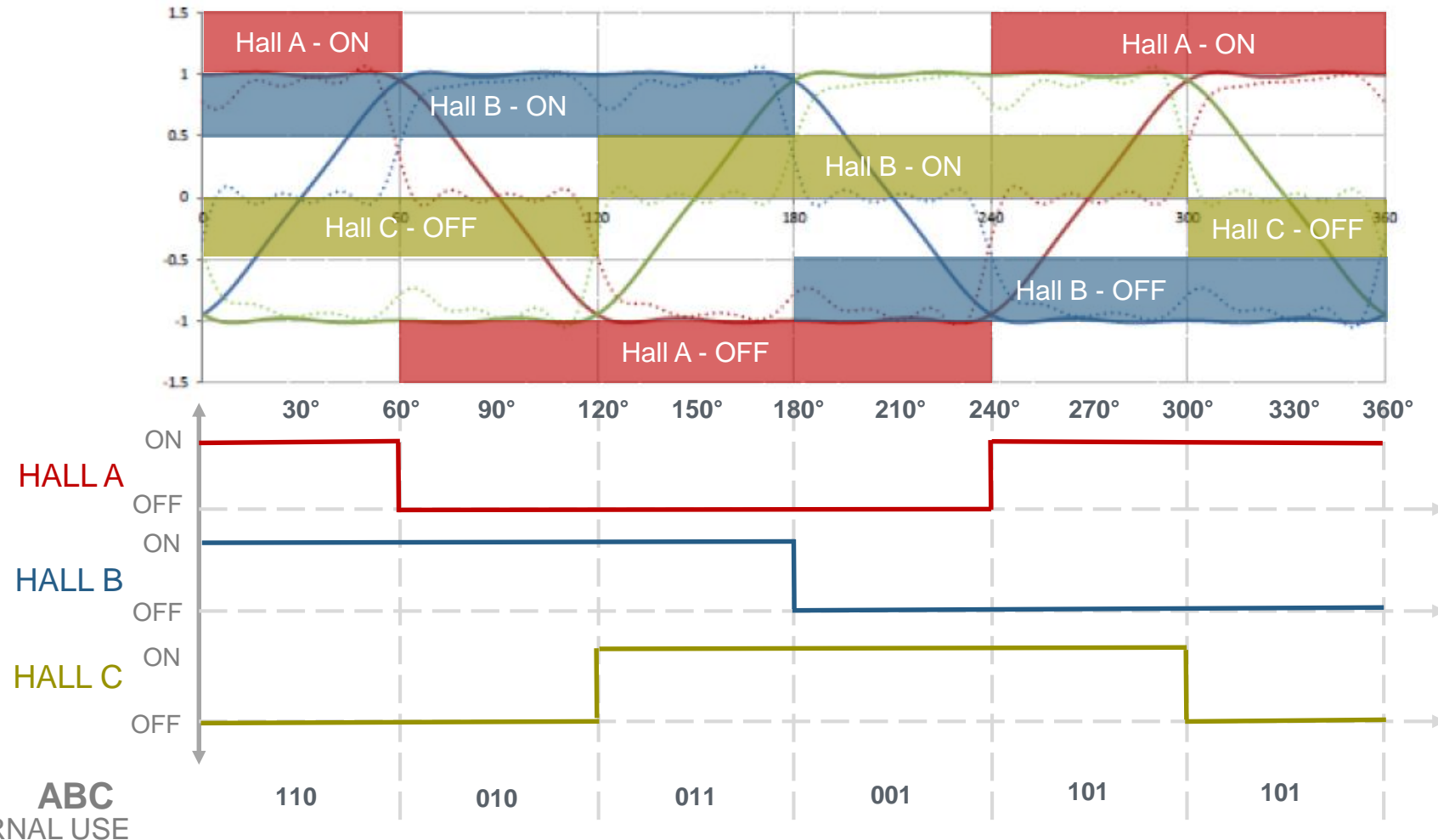
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Motor Phases			Hall Sensors		
Phase A	Phase B	Phase C	Hall A	Hall B	Hall C
$+V_{DC}$	$-V_{DC}$	$-V_{DC}$			
$+V_{DC}$	$+V_{DC}$	$-V_{DC}$			
$-V_{DC}$	$+V_{DC}$	$-V_{DC}$			
$-V_{DC}$	$+V_{DC}$	$+V_{DC}$			
$-V_{DC}$	$-V_{DC}$	$+V_{DC}$			
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Procedure:

1. Mark all the motor phases as A,B,C and Hall sensor outputs as A,B,C, in the desired order.
2. Set the current limit of power supply to 20-30% of nominal motor current.
3. Choose the direction of the motor rotation to be CW/CCW counterclockwise.
4. Supply voltage to motor phases according with the table
5. All the phases are always supplied.

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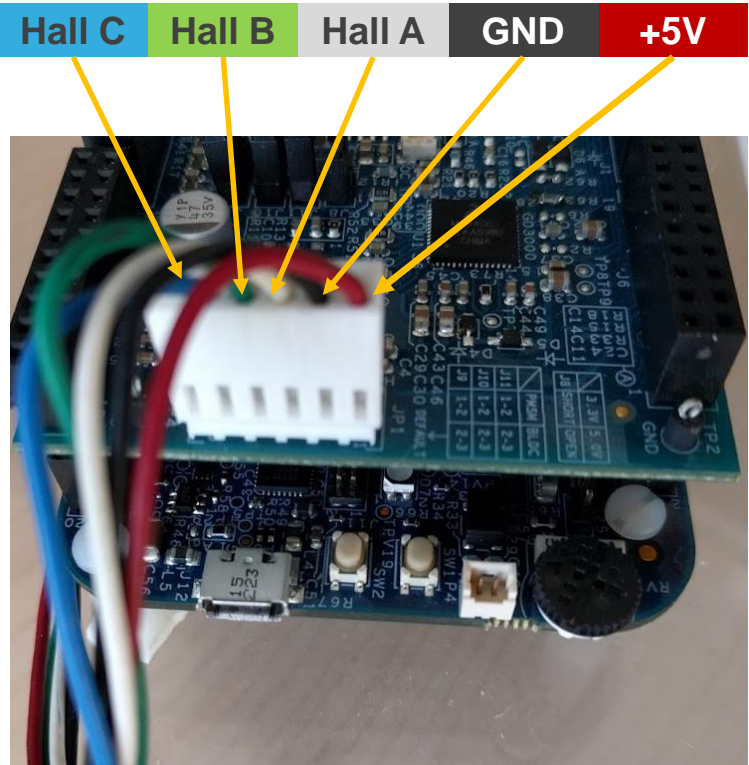
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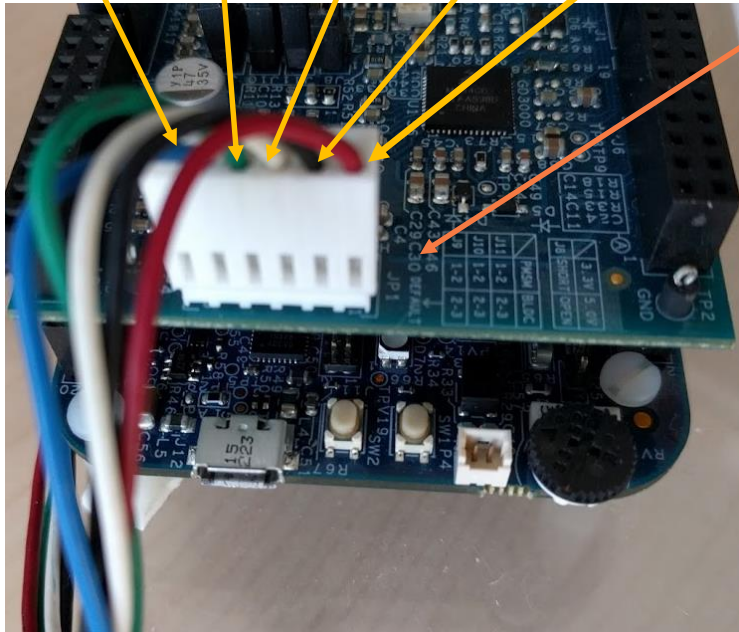


Reading the hall sensors

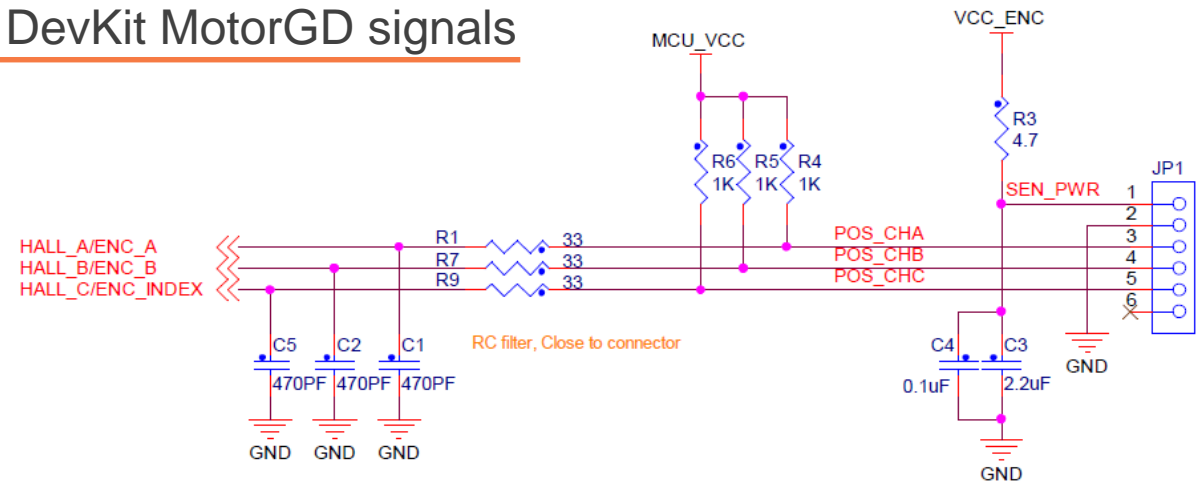


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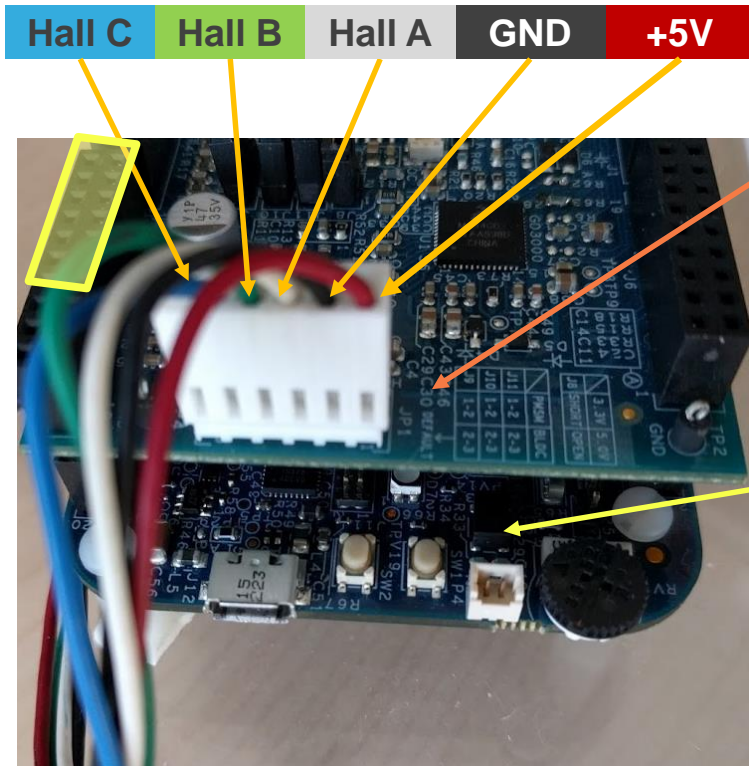
Hall C Hall B Hall A GND +5V



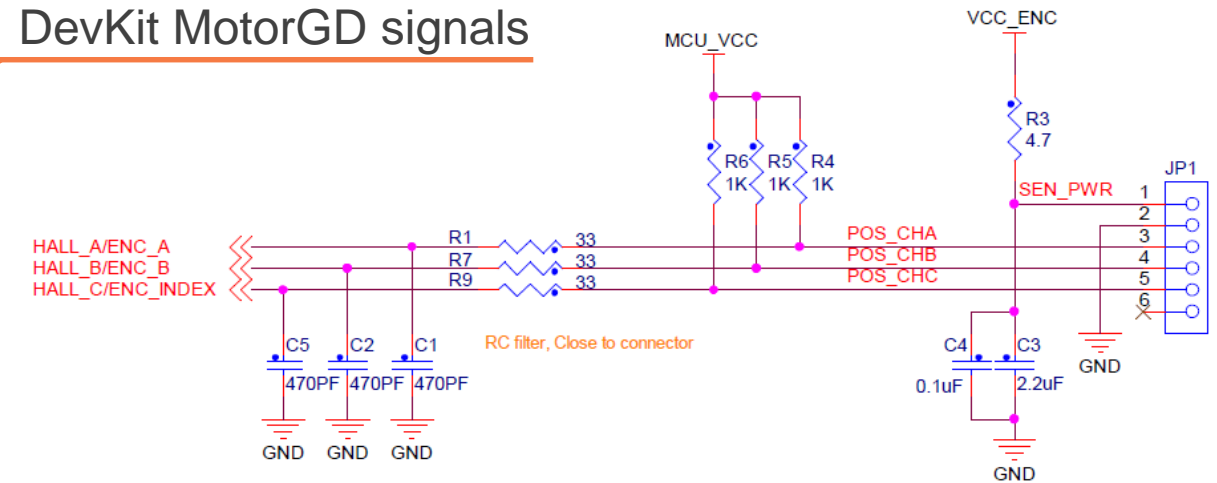
DevKit MotorGD signals



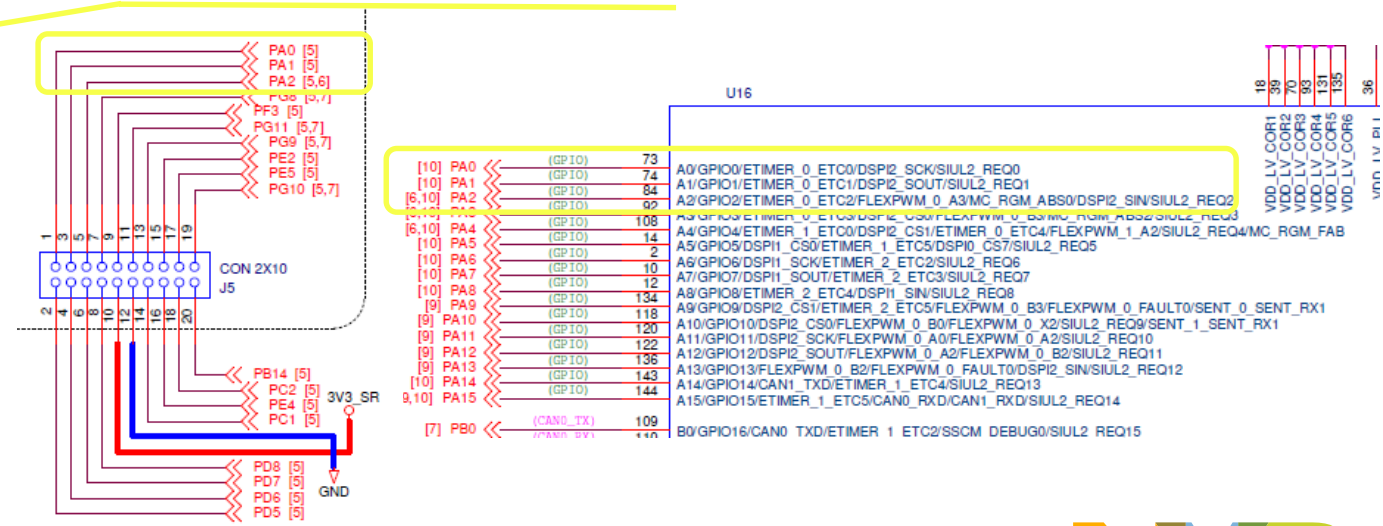
Reading the hall sensors



DevKit MotorGD signals



DevKit MPC5744P signals



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...you are now ready to design the next big thing. Good luck!

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