/ESG Group/FDD Module Requirements/EA4 Specific

ES208A CurrMeasArbn

Baselined v1.1 and Released

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1 Purpose

The Current Measurement Arbitration function is responsible to calculate the direct (D) and quadrature (Q) axes motor currents using the combined Clarke/Park transformation.

Is Requirement ?	.ASIL	.ReqCat	Review Date	Review Action	Review Action Status
False	NA				
False	NA				

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2 Interface Requirements

2.1 Definitions

2.1.1 Inputs

MotCtrlMotElecMeclPolarity: Motor electro mechanical polarity to determine the orientation of the three phases.

MotCtrlCurrMeasCorrlnSts: Current Measurement Correlation Status which indicates if there is any correlation fault exists between channels.

MotCtrlCurrMeasMotAgCorrd: Corrected motor position used to calculate Q and D axis motor current.

MotCtrlMotCurrCorrdA: Phase A motor current in amps.

MotCtrlMotCurrCorrdB: Phase B motor current in amps.

MotCtrlMotCurrCorrdC: Phase C motor current in amps.

MotCtrlMotCurrCorrdD: Phase D motor current in amps.

MotCtrlMotCurrCorrdE: Phase E motor current in amps.

MotCtrlMotCurrCorrdF: Phase F motor current in amps.

MotCtrlMotCurrQlfr1: Qualifier to indicate the status of the current sense amplifiers of Gate Drive 1.

MotCtrlMotCurrQlfr2: Qualifier to indicate the status of the current sense amplifiers of Gate Drive 2.

MotCtrlMotCurrRollgCntr1: Rolling Counter will be incremented when a new set of valid phase current measurement of Inverter 1 is performed.

MotCtrlMotCurrRollgCntr2: Rolling Conuter will be incremented when a new set of valid phase current measurement of Inverter 2 is performed.

2.1.2 Outputs

MotCtrlMotCurrDax: D-Axis Motor Current.

Is Requirement ?	.ASIL	.ReqCat	Review Date	Review Action	Review Action Status
False	NA				
False	NA				
False	NA				
False	NA				
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MotCtrlMotCurrQax: Q-Axis Motor Current.

2.1.3 Internally Defined Terms

None.

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False	NA				
False	NA				
False	NA				

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3 Requirements

3.1 Primary Functional Requirements

The Current Measurement Arbitration function is responsible to calculate the direct (D) and quadrature (Q) axes motor currents using the combined Clarke/Park transformation.

3.2 Hardware Requirements

None.

3.3 Software / Algorithm Requirements

3.3.1 Special Execution Requirements

The Current Measurement Arbitration function shall be executed every other motor control loop (125us).

3.3.2 Software Algorithm Decomoposition

The Current Measurement Arbitration function shall indicate the signal availability 1 is TRUE when all the following conditions are satisfied
MotCurrRollgCntr1 is NOT equal to the previous value or **MotCurrRollgCntr1** is equal to the previous value for the duration less than a field configurable value,
MotCurrQlfr1 is NOT equal to **Failed**,
CurrMeasCorrlnSts of Phase A, B, C is TRUE or **CurrMeasCorrlnSts** bits for Phase A, B, C is equal to **CORRLNSTSCOMPCON1_ULS_U08**.

The Current Measurement Arbitration function shall indicate the signal availability 2 is TRUE when all the following conditions are satisfied
MotCurrRollgCntr2 is NOT equal to the previous value or **MotCurrRollgCntr2** is equal to the previous value for the duration less than a field configurable value,
MotCurrQlfr2 is NOT equal to **Failed**,
CurrMeasCorrlnSts of Phase D, E, F is TRUE or **CurrMeasCorrlnSts** bits for Phase D, E, F is equal to **CORRLNSTSCOMPCON2_ULS_U08**.

The Current Measurement Arbitration function shall only use **MotCtrlMotCurrCorrdA, MotCtrlMotCurrCorrdB, MotCtrlMotCurrCorrdC** in Q and D axes current calculation, if signal availability 1 is TRUE and signal availability 2 is FALSE.

The Current Measurement Arbitration function shall only use **MotCtrlMotCurrCorrdD, MotCtrlMotCurrCorrdE, MotCtrlMotCurrCorrdF** in Q and D axes current calculation, if signal availability 2 is TRUE and signal availability 1 is FALSE.

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False	NA				
False	NA				
True	D		Monday, March 16, 2015		
False	NA				
False	NA				
False	NA				
False	NA				
True	D		Monday, March 16, 2015		
False	NA				
True	D		Monday, March 16, 2015		
True	D		Monday, March 16, 2015		
True	D		Monday, March 16, 2015		
True	D		Monday, March 16, 2015		

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The Current Measurement Arbitration function shall use average of **MotCtrlMotCurrCorrdA** and **MotCtrlMotCurrCorrdD,** average of **MotCtrlMotCurrCorrdB** and **MotCtrlMotCurrCorrdE,** average of **MotCtrlMotCurrCorrdC** and **MotCtrlMotCurrCorrdF** in Q and D axes current calculation, if both signal availability 1 and 2 are TRUE.
The Current Measurement Arbitration function shall set the average of **MotCtrlMotCurrCorrdA** and **MotCtrlMotCurrCorrdD** to zero**,** average of **MotCtrlMotCurrCorrdB** and **MotCtrlMotCurrCorrdE** to zero and the average of **MotCtrlMotCurrCorrdC** and **MotCtrlMotCurrCorrdF** to zero in Q and D axes current calculation, if both signal availability 1 and 2 are FALSE.
The Current Measurement Arbitration function shall use Park/Clark Transformation equations to calculate the direct (D) and quadrature (Q) axes motor currents using three phase currents and **MotCtrlMotElecMeclPolarity**.
The Current Measurement Arbitration function shall range limit the direct (D) and quadrature (Q) axes motor current outputs within **MOTCURRDAXQAXLIM_AMPR_F32** and -(**MOTCURRDAXQAXLIM_AMPR_F32**) constant.
3.4 Diagnostic Requirements
None
3.5 Manufacturing Requirements
None

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True	D		Monday, March 16, 2015		
True	D		Monday, March 16, 2015		
False	NA				
False	NA				
False	NA				
False	NA				