**Module Design Document**

**For**

**‘MotCurrRegVltgLimr’**

**VERSION: 4.0**

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**Location:** The official version of this document is stored in the Nexteer Configuration Management System.

**Revision History**

|  |  |  |  |  |
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| **Sl. No.** | **Description** | **Author** | **Version** | **Date** |
| 1 | Initial Version | Selva Sengottaiyan | 1.0 | 26-May-2015 |
| 2 | Updated graphical representation and added local function information | Nick Saxton | 2.0 | 13-Apr-2016 |
| 3 | Updated for FDD v2.1.0 | Matthew Leser | 3.0 | 7-Nov-2016 |
| 4 | Updated to fix Anomaly EA4#9045 | Matthew Leser | 4.0 | 04-Jan-2017 |
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# Abbrevations And Acronyms

|  |  |
| --- | --- |
| Abbreviation | Description |
| DFD | Design functional diagram |
| MDD | Module design Document |
| FDD | Functional Design Document |

# References

This section lists the title & version of all the documents that are referred for development of this document

|  |  |  |
| --- | --- | --- |
| Sr. No. | Title | Version |
| 1 | MDD Guidelines | Process 4.02.01 |
| 2 | Software Naming Conventions | Process 4.02.01 |
| 3 | Software Design and Coding standards | Process 4.02.01 |
| 4 | FDD – SF105A\_MotCurrRegVltgLimr\_Design | See Synergy sub project version |
|  |  |  |

# High-Level Description

*None*

# Design details of software module

## Graphical representation



## Data Flow Diagram

*Refer FDD*

## Module level DFD

*Refer FDD*

## Sub-Module level DFD

*Refer FDD*

## COMPONENT FLOW DIAGRAM

*Refer FDD*

# Variable Data Dictionary

## User defined typedef definition/declaration

*<This section documents any user types uniquely used for the module.>*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Typedef Name | Element Name | User Defined Type | Legal Range  (min) | Legal Range  (max) |
| None |  |  |  |  |
|  |  |  |  |  |

## Variable definition for enumerated types

|  |  |  |
| --- | --- | --- |
| Enum Name | Element Name | Value |
| None |  |  |

# Constant Data Dictionary

## Program(fixed) Constants

## Embedded Constants

## Local

|  |  |  |  |
| --- | --- | --- | --- |
| Constant Name | Resolution | Units | Value |
| MODIDXHILIM\_VOLT\_F32 | Single precision float | Volt | 1 |
| MODIDXLOLIM\_VOLT\_F32 | Single precision float | Volt | 0 |

## Global

|  |
| --- |
| Constant Name |
|  |

## Module specific Lookup Tables Constants

*None*

# Software Module Implementation

## Sub-Module Functions

## Initialization Functions

*MotCurrRegVltgLimrInit1*

## INIT: MotCurrRegVltgLimrInit1

## Design Rationale

*Design follows implemenetation in FDD.*

## Module Outputs

*Refer ‘MotCurrRegVltgLimrInit’ block in FDD*

## Module Internal

None

## PERIODIC FUNCTIONS

## INIT: MotCurrRegVltgLimrPER1

## Design Rationale

*Design follows implemenetation in FDD.*

## Module Outputs

*Design follows implemenetation in FDD.*

## Interrupt Functions

*None*

## Server runnables

*None*

## Store Local copy of outputs into Module Outputs

*None*

## Local Function/Macro Definitions

## Local function #1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | KpKiCtrl | Type | Min | Max |
| **Arguments Passed** | MotPropGain\_Ohm\_T\_f32 | Float32 | 0 | 2.25 |
|  | MotIntglGain\_Ohm\_T\_f32 | Float32 | 0 | 3.6 |
|  | SysSt\_Cnt\_T\_enum | Enum | SYSST\_DI | SYSST\_WRMININ |
|  | CmdErr\_Ampr\_T\_f32 | Float32 | -200 | 400 |
|  | \*MotVltgIntglCmdPrev\_Volt\_T\_f32 | Float32 | -1000 | 1000 |
|  | \*MotCurrRegVltgLimrMotVltgPropCmd\_Volt\_T\_f32 | Float32 | -26.5 | 26.5 |
|  | \*MotCurrRegVltgLimrMotVltgIntglPreLim\_Volt\_T\_f32 | Float32 | -26.5 | 26.5 |
|  | MotVltgIntglLoLim\_Volt\_T\_f32 | Float32 | -31 | 0 |
|  | MotVltgIntglHiLim\_Volt\_T\_f32 | Float32 | 0 | 31 |
|  | \*MotVltgPropCmd\_Volt\_T\_f32 | Float32 | -26.5 | 26.5 |
|  | \*MotVltgIntglCmd\_Volt\_T\_f32 | Float32 | 6 | 26.5 |

\* MotVltgPropCmd\_Volt\_T\_f32 and \* MotVltgIntglCmd\_Volt\_T\_f32 are outputs of this function.

## Local function #2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | ErrorCalcQax | Type | Min | Max |
| **Arguments Passed** | QaxCurrCmd\_Ampr\_T\_f32 | Float32 | -200 | 200 |
|  | QaxRplCmd\_Ampr\_T\_f32 | Float32 | -29 | 29 |
|  | QaxCoggCmd\_Ampr\_T\_f32 | Float32 | -6 | 6 |
|  | QaxCurrModif\_Ampr\_T\_f32 | Float32 | -200 | 200 |
|  | \* QaxCmdFinal\_Ampr\_T\_f32 | Float32 | -200 | 200 |
| **Returns** | CmdErrQax\_Ampr\_T\_f32 | Float32 | -200 | 400 |

\*QaxCmdFinal\_Ampr\_T\_f32 is also an output of this function.

## Local function #3

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | LoaScaFac | Type | Min | Max |
| **Arguments Passed** | CurrLoaMtgtnEn\_Cnt\_T\_logl | Boolean | FALSE | TRUE |
|  | IvtrLoaMtgtnEn\_Cnt\_T\_logl | Boolean | FALSE | TRUE |
|  | MotCtrlDualEcuMotCtrlMtgtnEna\_Cnt\_T\_logl | Boolean | FALSE | TRUE |
|  | \*CurrLoaScaFac\_Uls\_T\_f32 | Float32 | 0 | 1 |
|  | \*IvtrLoaScaFac\_Uls\_T\_f32 | Float32 | 0 | 1 |
|  | \*DualEcuScaFac\_Uls\_T\_f32 | Float32 | 0 | 1 |

\*CurrLoaScaFac\_Uls\_T\_f32, \*IvtrLoaScaFac\_Uls\_T\_f32, and \*DualEcuScaFac\_Uls\_T\_f32 are outputs of this function.

## Local function #4

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | MotCurr\_Pred | Type | Min | Max |
| **Arguments Passed** | MotInduQaxEstimdIvs\_IvsHenry\_T\_f32 | Float32 | 2240 | 33334 |
|  | MotREstimd\_Ohm\_T\_f32 | Float32 | 0.005 | 0.12565 |
|  | CurrQax\_Ampr\_T\_f32 | Float32 | -200 | 200 |
|  | MotVltgQaxPrev\_Volt\_T\_f32 | Float32 | -26.5 | 26.5 |
|  | CurrDax\_Ampr\_T\_f32 | Float32 | -200 | 200 |
|  | MotVltgDaxPrev\_Volt\_T\_f32 | Float32 | -26.5 | 26.5 |
|  | MotBackEmfVltg\_Volt\_T\_f32 | Float32 | -101.25 | 101.25 |
|  | ReacncQax\_Ohm\_T\_f32 | Float32 | -0.5 | 0.5 |
|  | ReacncDax\_Ohm\_T\_f32 | Float32 | -0.5 | 0.5 |
|  | MotInduDaxEstimdIvs\_IvsHenry\_T\_f32 | Float32 | 2240 | 33334 |
|  | MotCurrRegVltgLimrMotCurrPredEna\_Cnt\_T\_f32 | Boolean | FALSE | TRUE |
|  | MotCtrlCurrPredTi\_NanoSec\_T\_f32 | Float32 | 0 | 125000 |
|  | \*MotCurrQaxPred\_Ampr\_T\_f32 | Float32 | -200 | 200 |
|  | \*MotCurrDaxPred\_Ampr\_T\_f32 | Float32 | -200 | 200 |

\*MotCurrQaxPred\_Ampr\_T\_f32 and \*MotCurrDaxPred\_Ampr\_T\_f32 are outputs of this function.

## GLObAL Function/Macro Definitions

None

## Tranisition FUNCTIONS

None

# Known Limitations With Design

None

# UNIT TEST CONSIDERATION

None

# Appendix

*None*