/ESG Group/FDD Module Requirements/EA4 Specific

ES003A_PwrDiscnct

ES003A_PowerDisconnect

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ES003A_9	For the purposes of this document, the input signals are referred to as stated in the following (note each input is identified in a separate object for linking purposes to the design): Defined terms used in the document shall be in **bold text**.
ES003A_10	**BattVltg:** ADC Converted representation of Battery Voltage (Upstream of Power Disconnect)
ES003A_11	**BattVltgSwd1:** ADC Converted representation of Switch Voltage from Inverter 1 (Downstream of Power Disconnect)
ES003A_12	**BattVltgSwd2:** ADC Converted representation of Switch Voltage from Inverter 2(Downstream of Power Disconnect)
ES003A_13	**ELECGLBPRM_IVTRCNT_CNT_U08:** Number of Inverters
ES003A_106	**StrtUpSt:** Comprehensive collection of start-up bits indicating Power Up Sequence Type
ES003A_7	### 2.1.2 Outputs
ES003A_20	For the purposes of this document, the input signals are referred to as stated in the following (note each input is identified in a separate object for linking purposes to the design): Defined terms used in the document shall be in **bold text**.
ES003A_15	**PwrDiscnctATestCmpl**: Flag Indicating that the sequence A is complete
ES003A_14	**PwrDiscnctBTestCmpl:** Flag Indicating that the sequence B is complete
ES003A_8	### 2.1.3 Internally Defined Terms
ES003A_17	For the purposes of this document, the internally defined variables are referred to as stated in the following (note each input is identified in a separate object for linking purposes to the design): Defined terms used in the document shall be in <u>underlined text</u>.

ID	ES003A_PowerDisconnect
ES003A_21	DeltaVltg1: This indiactes the difference between **BattVltg** and **BattVltgSwd1.**
ES003A_23	DeltaVltg2: This indiactes the difference between **BattVltg** and **BattVltgSwd2**
ES003A_18	PwrDisncntMaxSwdVltg**:** Field configurable variable that indicates largest voltage at which **BattVltgSwd1** and **BattVltgSwd2** saturate (nominally 16V)
ES003A_22	PwrDiscnctOpenThd: Voltage threshold for determining **BattVltgSwd1** and **BattVltgSwd2** is open
ES003A_74	PwrDiscnctSequenceA**:** PwrDiscnctSequenceA are the necessary steps performed by this function before the power disconnect is allowed to be closed.
ES003A_75	PwrDiscnctSequenceB**:** PwrDiscnctSequenceB are the necessary steps performed by this function after the power disconnect has been closed.

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ES003A_3	# 3 Requirements
ES003A_25	## 3.1 Primary Functional Requirements
ES003A_26	The "Power Disconnect" Function shall verify that the PowerDisconnect is not stuck closed at initialization once per Ignition Cycle.
ES003A_27	## 3.2 Hardware Requirements
ES003A_48	NONE
ES003A_28	## 3.3 Software Requirements
ES003A_97	### 3.3.1 Special Execution Requirements
ES003A_98	The "Power Disconnect" function shall provide mechanism to split its startup procedure into pre-close (PwrDiscnctSequenceA) and post-close (PwrDiscnctSequenceB). This is necessary because a separate function is actually responsible for closing the power disconnect.
ES003A_99	The "Power Disconnect" Function shall provide mechanism for its startup sequences to wait for **StrtUpSt** to performs its actions.
ES003A_53	### 3.3.2 Functional Requirements
ES003A_56	#### 3.3.2.1 Sub-Function: Calculate Delta Voltage
ES003A_50	The "Power Disconnect" Function shall calculate DeltaVltg1 for **BattVltgSwd1** as below: DeltaVltg1 = Abs(Min(PwrDiscnctMaxSwdVltg, **BattVltg**) - **BattVltgSwd1**);
ES003A_76	The "Power Disconnect" Function shall calculate DeltaVltg2 for **BattVltgSwd2** as below: DeltaVltg2 = Abs(Min(PwrDiscnctMaxSwdVltg, **BattVltg**) - **BattVltgSwd2**); (Only when **IvtrCnt** = 2)
ES003A_46	#### 3.3.2.2 Sub-Function: Power Disconnect Sequence A Control
ES003A_47	The "Power Disconnect" Function shall verify if the EPS Primary Disconnect is not stuck closed in PwrDiscnctSequenceA.

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ES003A_87	The "Power Disconnect" Function shall reach conclusion **PwrDiscnctATestCmpl = TRUE** within 10s (CBE) under all conditons.
ES003A_61	**3.3.2.3 Sub-Function: Power Disconnect Sequence B Control**
ES003A_82	The "Power Disconnect" Function shall perform post-close sequences during PwrDiscnctSequenceB.
ES003A_88	The "Power Disconnect" Function shall reach conclusion for **PwrDiscnctBTestCmpl = TRUE** within 10s (CBE) under all conditions.
ES003A_29	**3.4 Diagnostic Requirements**
ES003A_30	**3.4.1 Power Disconnect Fault for Inverter1 at Init (NTC 0x042)**
ES003A_32	**3.4.1.1 Required Debounce Strategy**
ES003A_42	The "Power Diconnect" Function shall use the ISO Based Error Accumulator strategy for NTC 0x042.
ES003A_33	**3.4.1.2 Requirements to Perform Diagnostic Test Conditions**
ES003A_86	The "Power Disconnect" Function shall perform the test for NTC 0x42 during PwrDiscnctSequenceA.
ES003A_35	**3.4.1.3 Test Condition Negative Requirements**
ES003A_91	The "Power Disconnect" Function shall provide a negative result on the test condition for NTC 0x042.0 when DeltaVltg1 **<** PwrDiscnctOpenThd
ES003A_36	**3.4.1.4 Test Condition Positive Requirements**
ES003A_92	The "Power Disconnect" Function shall provide a positve result on the test condition for NTC 0x042 when none of the negative result requirements are satisfied.
ES003A_31	**3.4.2 Power Disconnect Fault for Inverter2 at Init (NTC 0x4A)**
ES003A_37	**3.4.2.1 Required Debounce Strategy**
ES003A_43	The "Power Diconnect" Function shall use the ISO Based Error Accumulator strategy for NTC 0x04A.
ES003A_38	**3.4.2.2 Requirements to Perform Diagnostic Test Conditions**

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ES003A_89	The "Power Disconnect" Function shall perform the test NTC 0x4A during PwrDiscnctSequenceA when **IvtrCnt** = 2.
ES003A_39	**3.4.2.3 Test Condition Negative Requirements**
ES003A_93	The "Power Disconnect" Function shall provide a negative result on the test condition for NTC 0x04A.0 when DeltaVltg2 < PwrDiscnctOpenThd
ES003A_40	**3.4.2.4 Test Condition Positive Requirements**
ES003A_95	The "Power Disconnect" Function shall provide positve result on the test condition for NTC 0x04A none of the negative result requirements are satisfied.