# Module -- Diagnostics Manager Core

# High-Level Description

# Figures

## Component Diagram

# Variable Data Dictionary

|  |  |  |
| --- | --- | --- |
| Module Inputs | Module Outputs | |
| MEC\_Cnt\_enum | |  |
| MfgDiagInhibit\_Cnt\_lgc | |  |
| SystemState\_Mode | |  |

## Module Internal Variables

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variable Name | Datatype | Resolution | Legal Range  (min) | Legal Range  (max) | Multiplicity | Software Segment  {Data Type} |
| NTCStrgArray\_Cnt\_str | NTCStrgArray | N/A | N/A | N/A | 1:1 | DIAGMGR\_START\_SEC\_VAR\_SAVED\_ZONEHGS\_UNSPECIFIED |
| NTCBlackBoxData\_Cnt\_str | NTCBlkBoxData | N/A | N/A | N/A | 1:1 | DIAGMGR\_START\_SEC\_VAR\_SAVED\_ZONEHGS\_UNSPECIFIED |
| DEMEventActive\_Cnt\_M\_lgc[D\_NUMOFDEMEVENTS\_CNT\_U08+1] | Boolean | N/A | FALSE | TRUE | 1:1 | DIAGMGR\_START\_SEC\_VAR\_CLEARED\_BOOLEAN |
| ResetNTCFlag\_Cnt\_M\_u08 | Refer \* | Refer \* | Refer \* | Refer \* | Refer \* | Refer \* |
| DiagMgr\_NTCInfo#\_Cnt\_M\_str | Refer \* | Refer \* | Refer \* | Refer \* | Refer \* | Refer \* |
|  |  |  |  |  |  |  |

### User defined typedef definition/declaration

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Typedef Name | Element Name | User Defined Type | Legal Range  (min) | Legal Range  (max) |
| NTCStrgArray |  | NTCStrg |  |  |
| NTCBlkBoxData |  | NTCBlkBoxType |  |  |
| typedef struct { } NTCBlkBoxType | NTC\_Cnt\_u08 | Uint8 | 1 | FULL |
| Param\_Cnt\_u08 | Uint8 | 0 | FULL |
| SystemState\_Cnt\_u08 | Uint8 | 0 | 4 |
| VehSpd\_Kph\_u8p0 | Uint8 | 0 | FULL |
| BlkBoxCfgData1 | Uint32 | 0 | FULL |
| BlkBoxCfgData2 | Uint32 | 0 | FULL |
| BlkBoxCfgData3 | Uint32 | 0 | FULL |
| HwTrq\_HwNm\_s4p11 | Sint16 | -10 | 10 |
| MtrTrq\_MtrNm\_s4p11 | Sint16 | -8.8 | 8.8 |
| IgnCtr\_Cnt\_u16 | Uint16 | 0 | FULL |
| typedef struct { } NTCStrg | NTC | NTCNumber | 0 | 511 |
| Status | uint8 | 0 | FULL |
| AgingCounter | uint8 | 0 | FULL |
| Status | uint8 | 0 | FULL |
| AgingCounter | uint8 | 0 | FULL |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

# Constant Data Dictionary

## Calibration Constants

|  |
| --- |
| Constant Name |
| k\_FltRspTbl\_Cnt\_str[] |
| k\_FltRmpRate\_UlspmS\_f32[] |

## Program(fixed) Constants

### Embedded Constants

#### Local

|  |  |  |  |
| --- | --- | --- | --- |
| Constant Name | Resolution | Units | Value |
| D\_FLTRSPNTCACTIVEBIT\_CNT\_B32 | N/A | Counts | 0x00800000 |
| D\_FLTRSPRECOVERABLEBIT\_CNT\_B32 | N/A | Counts | 0x00400000 |
| D\_FLTRSPHWASBSYSTMFLTBIT\_CNT\_B32 | N/A | Counts | 0x00200000 |
| D\_FLTRSPDEFVEHSPDBIT\_CNT\_B32 | N/A | Counts | 0x00100000 |
| D\_FLTRSPDEFTEMPBIT\_CNT\_B32 | N/A | Counts | 0x00080000 |
| D\_FLTRSPSCOMHWANOTVALIDBIT\_CNT\_B32 | N/A | Counts | 0x00040000 |
| D\_FLTRSPWIRDISABLEBIT\_CNT\_B32 | N/A | Counts | 0x00008000 |
| D\_FLTRSPPWRCYCLTCHBIT\_CNT\_B32 | N/A | Counts | 0x00000010 |
| D\_FLTRSPNTCINHIBITNOTOPERATEBIT\_CNT\_B32 | N/A | Counts | 0x00000020 |
| D\_FLTRSPNTCINHIBITRUNBIT\_CNT\_B32 | N/A | Counts | 0x00000040 |
| D\_FLTRSPRAMPBITS\_CNT\_B32 | N/A | Counts | 0x0000000F |
| D\_FLTRSPBLKBOXBITS\_CNT\_B32 | N/A | Counts | 0x00003800 |
| D\_BLKBOXBITOFFSET\_CNT\_U08 | N/A | Counts | 11 |
| D\_RAMPNONE\_CNT\_U8 | 1 | Counts | 0x0F |
| D\_RAMPF2\_CNT\_U8 | 1 | Counts | 0x0E |
| D\_RAMPF1\_CNT\_U8 | 1 | Counts | 0x0D |
| D\_DIAGRMPRTLOLMT\_ULSPMS\_F32 | Single precision float | Uls/mS | 0.0001 |
| D\_DIAGRMPRTHILMT\_ULSPMS\_F32 | Single precision float | Uls/mS | 0.5 |
| D\_FLTRESPIVTR1INACTV\_CNT\_U32 | N/A | Counts | 0x00010000UL |
| D\_FLTRESPIVTR2INACTV\_CNT\_U32 | N/A | Counts | 0x00020000UL |

#### Global

|  |
| --- |
| Constant Name |
| D\_NTCACTIVEBITS\_CNT\_B8 |

### Module specific Lookup Tables Constants

|  |  |  |  |
| --- | --- | --- | --- |
| Constant Name | Resolution | Value | Software Segment |
| T\_NTCMapTbl#\_Cnt\_enum[SIZE] | N/A | Refer \* | AP\_DIAGMGR\_CONST |
| T\_DiagMgrNtcAppInfoMap\_Cnt\_Str[SIZE] | N/A | Refer \* | AP\_DIAGMGR\_CONST |
| T\_DiagMgrNtcInfoPtr\_Cnt\_Str[SIZE] | N/A | Refer \* | AP\_DIAGMGR\_CONST |

Note: “ Refer \*” - Refer to Diagnostics\_Manager\_GeneratedCfg\_MDD

Note Size and elements of Table constants varies across projects. Check project configuration files Under UTP/ Contract folder for data.

# Functions/Macros used by the Sub-Modules

## Library Functions / Macros

The library and functions / Macros that are called by the various sub modules are identified below,

1. TableSize\_m()

## Data Hiding Functions

1. <None>

## Function Mapping

1. DiagMgr\_ReportDet(errorId) ↔ Det\_ReportError(0,0,0,errorId)

## Global Functions/Macros Defined by this Module

### Diagnostic Manager Initialization

Note: \*doc in below table is Diagnostics\_Manager\_GeneratedCfg\_MDD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_Init\_Core | Type | Min | Max |
| **Arguments Passed** | NTCInfo\_Cnt\_T\_str[SIZE] | Refer Range of DiagMgr\_NTCInfo#\_Cnt\_M\_str[SIZE] in \*doc | | |
|  | NumElements\_Cnt\_T\_u08 | Refer Range of DIAGMGR\_EVENTNUM\_# in \*doc | | |
|  | CurrentAppIdx\_Cnt\_T\_u08 | Refer Range of DIAGMGR\_APID\_# in \*doc | | |
|  | DiagMgrInitComp\_Ptr\_T\_lgc | Refer Range of DiagMgrInitComp#\_Cnt\_M\_lgc | | |
|  | NTCInfoQueue\_Cnt\_T\_str[5] | Refer Range of NTCInfoQueue#\_Cnt\_M\_str[SIZE] in \*doc | | |
|  | NTCQueueIndex\_Ptr\_T\_u08 | Refer Range of NTCQueueIndex#\_Cnt\_M\_u08 in \*doc | | |
|  | DiagSts\_Cnt\_T\_b16[SIZE] | Refer Range of DiagSts#\_Cnt\_M\_b16[SIZE] in \*doc | | |
|  | ActiveRmpRate\_UlspmS\_T\_f32[SIZE] | Refer Range of ActiveRmpRate#\_UlspmS\_M\_f32[SIZE] in \*doc | | |
|  | ActDiagSts\_Ptr\_T\_u08 | Refer Range of ActDiagSts#\_Cnt\_M\_u08 in \*doc | | |
| **Return Value** | none |  |  | |

#### Description



### Diagnostic Manager Periodic Code

Note: \*doc in below table is Diagnostics\_Manager\_GeneratedCfg\_MDD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_Per\_Core | Type | Min | Max |
| **Arguments Passed** | NTCInfo\_Cnt\_T\_str[SIZE] | Refer Range of DiagMgr\_NTCInfo#\_Cnt\_M\_str[SIZE] in \*doc | | |
|  | NumElements\_Cnt\_T\_u08 | Refer Range of DIAGMGR\_EVENTNUM\_# in \*doc | | |
|  | DiagSts\_Cnt\_T\_b16[SIZE] | Refer Range of DiagSts#\_Cnt\_M\_b16[SIZE] in \*doc | | |
|  | ActiveRmpRate\_UlspmS\_T\_f32[SIZE] | Refer Range of ActiveRmpRate#\_UlspmS\_M\_f32[SIZE] in \*doc | | |
|  | ActDiagStsIdx\_Ptr\_T\_u08 | Refer Range of ActDiagSts#\_Cnt\_M\_u08 in \*doc | | |
|  | T\_NTCMapTbl\_Cnt\_enum[SIZE] | Refer range of T\_NTCMapTbl#\_Cnt\_enum[SIZE] in \*doc | | |
|  | PrevResetNTCFlag\_Ptr\_T\_u08 | Refer Range of ResetNTCFlag#\_Cnt\_M\_u08 in \*doc | | |
| **Return Value** | none |  |  | |

#### Description



### Diagnostic Manager Transition Core

Note: \*doc in below table is Diagnostics\_Manager\_GeneratedCfg\_MDD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | DiagMgr\_Trns\_Core | Type | Min | Max |
| **Arguments Passed** | NTCInfo\_Cnt\_T\_str[SIZE] | Refer Range of DiagMgr\_NTCInfo#\_Cnt\_M\_str[SIZE] in \*doc | | |
|  | NumElements\_Cnt\_T\_u08 | Refer Range of DIAGMGR\_EVENTNUM\_# in \*doc | | |
|  | T\_NTCMapTbl\_Cnt\_enum[79] | Refer range of T\_NTCMapTbl#\_Cnt\_enum[SIZE] in \*doc | | |
| **Return Value** | none |  |  | |

#### Description



### Diagnostic Manager Get NTC Failed

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | NxtrDiagMgr\_GetNTCFailed\_Core | Type | Min | Max |
| **Arguments Passed** | NTC\_Cnt\_T\_enum | NTCNumber | 0 | 511 |
|  | NTCFailed\_Ptr\_T\_lgc | const boolean pointer | False | True |
| **Return Value** | RetVal | Std\_ReturnType | E\_NOT\_OK | E\_OK |

#### Description



### Diagnostic Manager Get NTC Active

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | NxtrDiagMgr\_GetNTCActive\_Core | Type | Min | Max |
| **Arguments Passed** | NTC\_Cnt\_T\_enum | NTCNumber | 0 | 511 |
|  | NTCActive\_Ptr\_T\_lgc | const boolean pointer | FALSE | TRUE |
| **Return Value** | RetVal | Std\_ReturnType | E\_NOT\_OK | E\_OK |

#### Description



### Diagnostic Manager Get NTC Status

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | NxtrDiagMgr\_GetNTCStatus\_Core | Type | Min | Max |
| **Arguments Passed** | NTC\_Cnt\_T\_enum | NTCNumber | 0 | 511 |
|  | Status\_Ptr\_T\_u08 | const boolean pointer | FALSE | TRUE |
| **Return Value** | RetVal | Std\_ReturnType | E\_OK  E\_NOT\_OK | |

#### Description



### Diagnostic Manager Set NTC Status

Note: \*doc in below table is Diagnostics\_Manager\_GeneratedCfg\_MDD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | NxtrDiagMgr\_SetNTCStatus\_Core | Type | Min | Max |
| **Arguments Passed** | NTC\_Cnt\_T\_enum | NTCNumber | 0 | 511 |
|  | Param\_Cnt\_T\_u08 | Uint8 | 0 | FULL |
|  | Status\_Cnt\_T\_enum | NxtrDiagMgrStatus | NTC\_STATUS\_PASSED  NTC\_STATUS\_FAILED  NTC\_STATUS\_PREPASSED  NTC\_STATUS\_PREFAILED | |
|  | NTCInfo\_Cnt\_T\_str[79] | Refer Range of DiagMgr\_NTCInfo#\_Cnt\_M\_str[SIZE] in \*doc | | |
|  | DiagSts\_Cnt\_T\_b16[2] | Refer Range of DiagSts#\_Cnt\_M\_b16[SIZE] in \*doc | | |
|  | ActiveRmpRate\_Cnt\_T\_f32[2] | Refer Range of ActiveRmpRate#\_UlspmS\_M\_f32[SIZE] in \*doc | | |
|  | ActDiagSts\_Ptr\_T\_u08 | Refer Range of ActDiagSts#\_Cnt\_M\_u08 in \*doc | | |
| **Return Value** | RetVal | Std\_ReturnType | E\_OK  E\_NOT\_OK | |

#### Description







### Diagnostic Manager Report NTC Status

Note: \*doc in below table is Diagnostics\_Manager\_GeneratedCfg\_MDD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | NxtrDiagMgr\_ReportNTCStatus\_Core | Type | Min | Max |
| **Arguments Passed** | NTC\_Cnt\_T\_enum | NTCNumber | 0 | 511 |
|  | Param\_Cnt\_T\_u08 | Uint8 | 0 | FULL |
|  | Status\_Cnt\_T\_enum | NxtrDiagMgrStatus | NTC\_STATUS\_PASSED  NTC\_STATUS\_FAILED  NTC\_STATUS\_PREPASSED  NTC\_STATUS\_PREFAILED | |
|  | NTCInfoQueue\_Cnt\_T\_str [5] | Refer Range of NTCInfoQueue#\_Cnt\_M\_str[SIZE] in \*doc | | |
|  | NTCQueueIndex\_Ptr\_T\_u08 | Refer Range of NTCQueueIndex#\_Cnt\_M\_u08 in \*doc | | |
| **Return Value** |  | Std\_ReturnType | E\_OK | |

#### Description



## Local Functions/Macros Used by this MDD only

### Set Bits

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | SetBits\_u8 | Type | Min | Max |
| **Arguments Passed** | Data | const uint8 pointer | 0 | 255 |
|  | BitMask | uint8 | 0 | 255 |
| **Return Value** | N/A |  |  |  |

#### Description

\*Data |= BitMask

### Clear Bits

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | ClrBits\_u8 | Type | Min | Max |
| **Arguments Passed** | Data | const uint8 pointer | 0 | 255 |
|  | BitMask | uint8 | 0 | 255 |
| **Return Value** | N/A |  |  |  |

#### Description

\*Data &= ~BitMask

### Read Bit

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | ReadBit\_u8 | Type | Min | Max |
| **Arguments Passed** | Data | uint8 | 0 | 255 |
|  | BitMask | uint8 | 0 | 255 |
| **Return Value** | (anonymous) | boolean | FULL | FULL |

#### Description

IF 0 = (Data & BitMask) THEN

return FALSE

ELSE

return TRUE

ENDIF

### Set Bits

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | SetBits\_u16 | Type | Min | Max |
| **Arguments Passed** | Data | const uint16 pointer | FULL | FULL |
|  | BitMask | uint16 | FULL | FULL |
| **Return Value** | N/A |  |  |  |

#### Description

\*Data |= BitMask

### Read Bit

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | ReadBit\_u32 | Type | Min | Max |
| **Arguments Passed** | Data | uint32 | 0x000000 | 0xFFFFFF |
|  | BitMask | uint32 | 0x000000 | 0xFFFFFF |
| **Return Value** | (anonymous) | boolean | FULL | FULL |

#### Description

IF 0 = (Data & BitMask) THEN

return FALSE

ELSE

return TRUE

ENDIF

### Process Diagnostic Status

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | ProcessDiagSts | Type | Min | Max |
| **Arguments Passed** | FltRsp\_Cnt\_T\_u32 | Uint32 | 0 | FULL |
|  | DiagSts\_Ptr\_T\_b16 | const uint16 pointer | 0 | FULL |
| **Return Value** | N/A |  |  |  |

#### Description



### Process Ramp Response

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | ProcessRampResponse | Type | Min | Max |
| **Arguments Passed** | FltRsp\_Cnt\_T\_u32 | Uint32 | 0 | FULL |
|  | ActiveRmpRate\_Ptr\_T\_f32 | Const float32 pointer | 0.0001 | 0.5 |
|  | DiagSts\_Ptr\_T\_b16 | Const uint16 pointer | 0 | FULL |
| **Return Value** | N/A |  |  |  |

#### Description



### Failed Check and Processing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Function Name** | FailedCheckAndProcessing | Type | Min | Max |
| **Arguments Passed** | NTCInfo\_Ptr\_T\_str | const uint16 NTCInfo\_Str | See section 3.1.1 | See section 3.1.1 |
|  | DiagSts\_Ptr\_T\_b16 | const uint16 pointer | 0 | FULL |
|  | MaxRampRate\_Ptr\_T\_f32 | Const float32 pointer | 0.0001 | 0.5 |
|  | NTC\_Cnt\_T\_enum | NTCNumber | 0 | 511 |
| **Return Value** | N/A |  |  |  |

#### Description



# Software Module Implementation

## Runtime Environment (RTE) Initial Values

|  |  |
| --- | --- |
| Data | Value |
|  |  |

## Initialization Functions

None

## Periodic Functions

None

## Fault Recovery Functions

None

## Shutdown Functions

None

## Interrupt Functions

None

## Fault Recovery Functions

None

## Shutdown Functions

None

## Interrupt Functions

None

## Serial Communication Functions

None

# Execution Requirements

## Execution Sequence of the Module

## Execution Rates for sub-modules called by the Scheduler

This table serves as reference for the Scheduler design

|  |  |  |
| --- | --- | --- |
| Function Name | Calling Frequency | System State(s) in which the function is called |
|  |  |  |

## Execution Requirements for Serial Communication Functions

|  |  |
| --- | --- |
| Function Name | Sub-Module called by (Serial Comm Function Name) |
|  |  |

# Memory Map Definition Requirements

## Sub Modules (Functions)

This table identifies the software segments for functions identified in this module.

|  |  |
| --- | --- |
| Name of Sub Module | Software Segment |
|  |  |

## Global and Local Functions

This table identifies the software segments for local functions identified in this module.

|  |  |
| --- | --- |
| Name of Sub Module | Software Segment |
| FailedCheckAndProcessing | AP\_DIAGMGR\_CODE |
| ProcessRampResponse | AP\_DIAGMGR\_CODE |
| ProcessDiagSts | AP\_DIAGMGR\_CODE |
| SetBits\_u8 | AP\_DIAGMGR\_CODE |
| ClrBits\_u8 | AP\_DIAGMGR\_CODE |
| ReadBit\_u8 | AP\_DIAGMGR\_CODE |
| ReadBit\_u32 | AP\_DIAGMGR\_CODE |
| SetBits\_u16 | AP\_DIAGMGR\_CODE |

# Known Issues / Limitations With Design

1. (Item #1)

# Revision Control Log

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev #** | **Change Description** | **Date** | **Author Initials** |
| 1 | Initial MDD version | 14-Feb-13 | VK |
| 2 | MDD catch up to match latest SRC Ver 4 | 24- June- 13 | NRAR |
| 3 | Updates/cleanup while adding latch active diagnostic | 5-OCT-13 | Jared |
| 3 | Updates to MDD done as per UTP fixes  Ver is still taken as 3 to match with synergy ver | 19-Mar-14 | KPIT-PM |
| 4 | Updated for Inverter1 and Inverter 2 Fault response | 20-July-15 | Selva |