*Project: RMC75E TEST BENCH*

*Module:* DiscoverID*.vhd*

*Author: Satchel Hamilton*

*Company: Delta Motion*

*Date: 7/13/2023*

*Last updated: July 26, 2023*

Contents

[High Level 1](#_Toc141280683)

[Low level 2](#_Toc141280684)

[Simulation 3](#_Toc141280685)

# High Level

The "DiscoverID" module is a key component of the RMC75E Rev 3.0 board design. It serves the purpose of identifying and configuring different types of modules connected to the FPGA. The module reads the Control Module ID word during system power-up, which is then used by the CPU and FPGA to determine the transducer interface logic configuration. The design employs state machines and conditional logic to handle the identification and configuration process. The module interacts with other modules like "DiscoverControlID" and "DiscoverExpansionID" to achieve its intended functionality.

The high-level functionality of the "DiscoverID" module can be summarized as follows:

1. On system power-up, the Control Module ID word is read from the Control Module into the FPGA.
2. The FPGA identifies the connected modules based on the Control Module ID and sets appropriate control signals.
3. The module configures the transducer interface logic based on the detected module types (AP2, A2, DIO8, Q1, MDT1, MDT2, QUAD1, QUAD2, ANLG1, ANLG2, ENET).
4. After the identification process is complete, the module allows LED control for the connected Expansion Modules.
5. The module continuously monitors the state of the system and retains the configuration data until the next system power cycle.

# Low level

The "DiscoverID" module’s primary role is to identify the types of modules connected to the FPGA and configure the interface logic, contributing to the proper functioning of the RMC75E Rev 3.0 board.

It interacts with other modules such as "DiscoverControlID" and "DiscoverExpansionID" through component declarations. The main operations of the "DiscoverID" module are described below in more detail:

1. **Input and Output Ports:**
   * The module has various input and output ports, including RESET, SysClk, SlowEnable, FPGAIDRead, ControlCardIDRead, etc. These ports enable communication with other parts of the system.
2. **Constants and Identifiers:**
   * The module uses constants to represent different FPGA IDs, versions, and module types, such as AP2, A2, DIO8, Q1, MDT1, MDT2, QUAD1, QUAD2, ANLG1, ANLG2, and ENET.
   * FPGA\_ID, FPGA\_Major\_Rev, and FPGA\_Minor\_Rev are used to store the identification information of the FPGA being used.
3. **State Machines and Module Identification:**
   * The module employs state machines and conditional checks to identify the connected modules based on the Control Module ID word.
   * By examining specific bits of the Control Module ID, the module determines the type of module connected (e.g., AP2, A2, DIO8, Q1, MDT, QUAD, ANLG, or ENET).
4. **Control Signal Configuration:**
   * Depending on the module type detected, the module sets appropriate control signals like intExp0Mux, intExp1Mux, intExp2Mux, and intExp3Mux.
   * The module also sets ExpOldAP2 and Exp0Mux, Exp1Mux, Exp2Mux, and Exp3Mux signals to configure the transducer interface logic for connected modules.
5. **Discovery Completion and LED Control:**
   * The "DiscoveryComplete" signal is used to control the multiplexer for the Expansion Module LED signals. After the discovery process is complete, the connected modules' LED control is activated.
6. **Retention and Reset Signals:**
   * The module uses various reset signals to control the state machines and ensure proper initialization and behavior during power-up and system reset.
   * Configuration data related to the connected modules is retained and used until the next system power cycle.

## Simulation