Power over Ethernet

Software GUI

User Guide

Enhanced Mode

PoE+ Mode
High Power 4-pairs Mode

Revision 1.3

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Reference Documents

- 06-0012-080 Layout Design Guidelines for PoE Systems, AN-128.
- 06-0032-056 UG-PD63000G Serial Communication Protocol
- 06-0031-056 UG-PD33000B Serial Communication Protocol
- 06-1240-056 UG-PD-IM-7548, 48 port High Power 4-pairs evaluation board
- 06-1206-056-UG-PD-IM-7308 8 port evaluation board.doc

The above documents can be obtained via our Customer Support. To access other documents, go to our web site at **http://www.Microsemi.com/** and under Tech Support\Documentation, look up for the documents.

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Chapter 1 - About this Guide

1.1   Objectives

This User Guide provides both a description and operation procedures of the Microsemi's software GUI (Graphic User Interface) utilized to demonstrate the Enhanced mode, PoE+mode and the High Power 4-pairs mode.

1.2   Audience

This User Guide is intended for qualified personnel, e.g. operators and technicians who have a background in basic concepts of electronics and software.

1.3   Organization

This Guide is divided into several sections as follow:

Chapter 1   **About this Guide** - describes the objectives audience organization and related documentation

Chapter 2   **Introduction** - describes the GUI's main functions and the operation modes

Chapter 3   **Installation** – Provides safety precautions, software requirements, hardware requirements and hardware setup

Chapter 4   **Enhanced Mode Operation -** describes the GUI's Enhanced Mode Operation, its various screens and the meaning of each screen's button/indicator

Chapter 5   **PoE+ Mode Operation** - describes the GUI's PoE+ Mode Operation, its various screens and the meaning of each screen's button/indicator

Chapter 6   **High Power 4-pairs Mode Operation**- describes the GUI's High Power 4-pairs Mode Operation, its various screens and the meaning of each screen's button/indicator

Chapter 7   **Troubleshooting**– Provides a useful troubleshooting guide and Program Download procedure

1.4   Evaluation Board Kit

The Evaluation Board Kit comes with the following items:

1   PoE Manager Enhanced mode Installation CD
2   Aardvark-Evaluation board I^{2}C Adapting cable

Chapter 2 - Introduction

2.1   Introduction

Microsemi's Demo boards provide the designer with the perfect environment to evaluate the performance and the implementation of the Enhanced, PoE+ and the High Power 4-pairs modes.

2.2   Operating Modes

2.2.1 Enhanced Mode

The Enhanced Mode configuration for PoE systems is divided into two different systems as follows:

1. PoE system based on the PoE controller (PD69000) and four PoE managers ICs (PD69012 or PD69008) shown in Figure 2-1 and functioning as slaves to a PoE Controller.
2. PoE system based on the PoE controller (PD63000) and two PoE managers ICs (PD64012G/H or PD64004A/H) shown in Figure 2-2 and functioning as slaves to a PoE Controller.

The PoE operations are performed automatically by the PoE manager ICs, while the PoE Controller performs power management and other tasks.

The Host CPU communicates with the PoE Controller via an isolated UART interface or I^{2}C interface. The PoE Controller is used to initialize, control and monitor each of the PoE managers ICs via an internal ESPI (69000 system) / SPI (63000 system) bus.

The PoE Controller is used for additional Power over Ethernet features, such as:

- Legacy PDs detection
- Enhanced power management algorithms
- Port matrix control
- Communication protocol translator

PoE manager ICs types:
IEEE802.3af standard ICs (AF ICs) - PD64012/G/GH , PD64004A/AH, PD69012 and PD69008
IEEE802.3at standard (AT ICs) - PD64012GH, PD64004AH, PD69012 and PD69008.

The Enhanced mode software supports the following features:

- Support up to 96 ports.
- Real-time refresh rate (less than two-seconds intervals) of system and port measurements, including:
    - General power, voltage and current measurements
    - Status (on, off, power management, overload) per port
    - Power consumption [W] per port
    - Current [mA] per port
    - Class per port (0-4)
    - Enable / disable per port
- Automatic detection of connected devices
- Supports 600ma currents in AT mode
- Displays GUI version and PoE Controller's software version
- Line Detection Algorithms

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- IEEE 802.3af
- IEEE 802.3af + Pre Standard
- Resetting of system (by pushbutton)
- Restore default values (by pushbutton)
- Save System Settings (by pushbutton)
- Graphic display of port status from PoE Devices (port on, port off due to AC disconnect or due to overload)
- Power budget -
- AF - banks 1 to 7.
- AT - banks 0 to 15 .
- Advanced power management
- Setting Vmain limits
- Capability to define maximum power per port
- Defining interrupt Mask parameters and viewing interrupt statuses
- Thermal emulation of the PD64012 and PD64004A and setting thermal limits
- Enables setting of the priority for all ports
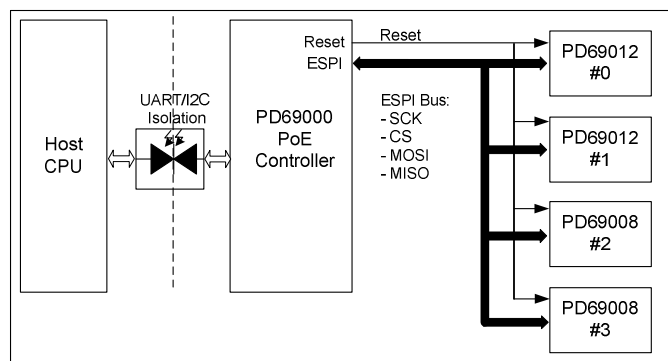- Establishes Logical/Physical port relationship

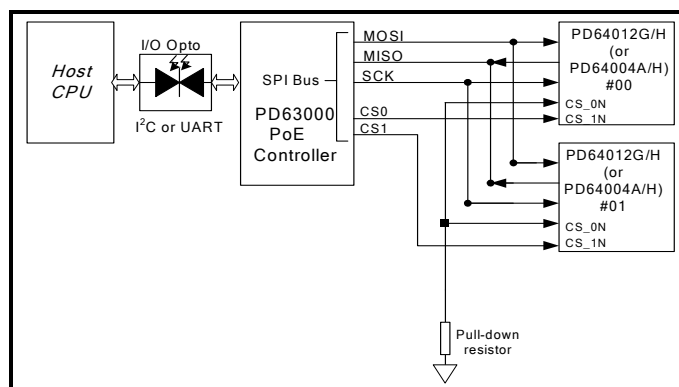**Figure 2-1: Enhanced Mode- Utilizing the PD69000**

Figure 2-2: Enhanced Mode- Utilizing the PD63000

2.2.2 PoE+ Mode

The switch host CPU communicates with the PD33000B, via an isolated I^{2}C or UART bus, (see Figure 2-3). In this mode of operation, the PD64004s communicate with the PD33000B PoE Controller, via an SPI bus. In this mode, the PD64004s are directly slaved to the PD33000B. The PoE Controller is used for additional Power over Ethernet features, such as:

♦ Legacy PDs detection

♦ PoE+ power management algorithms

♦ Communication protocol translator

The PoE+ mode software supports the following features:

♦ Supports up to 8 ports (2 x PD64004A PoE Devices)

♦ Automatic detection of devices connected (number of ports)

♦ Display GUI version and firmware (PoE Controller) version

♦ Real-time refresh rate (less than two-seconds intervals) of system and port measurements, including:

  • Current [mA]

  • Power consumption [W]

  • Class of PD (0-4)

  • Per port Status (on, off, power management, overload)

♦ Graphic display of port status from PoE Devices

♦ (port on, port off due to AC disconnection mode or due to overload …)

♦ Thermal emulation of the two PD64004As; two temperature meters taking readings within the devices, with less than two seconds intervals.

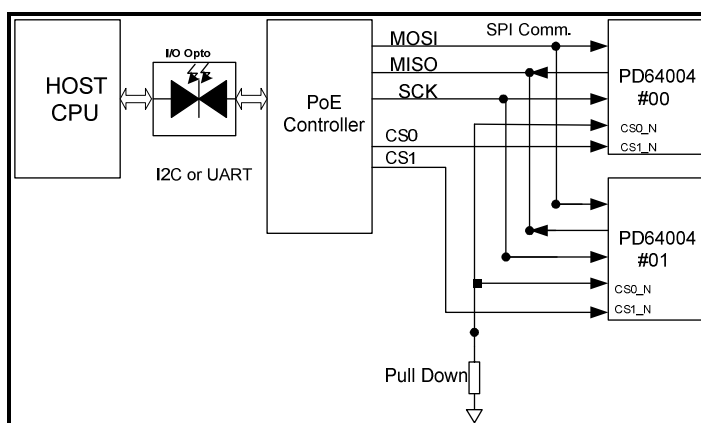♦ System power management

♦ System interrupt view and mask

Figure 2-3: PoE+ Mode

2.2.3   High Power 4-pairs Mode

The Host CPU can communicate with the Evaluation Board via a serial port (UART) or an I^{2}C port (see Figure 2-4). The system operates in the Enhanced mode only.

In this mode of operation, the switch Host CPU communicates with the PD83000, via an isolated I^{2}C or UART bus, as shown in Figure 2-4. The PoE devices communicate with the PD83000 PoE Controller, via an SPI bus.

The PoE devices are directly slaved to the PD83000. The PoE Controller is used to support all the Enhanced mode features and High-power requirements such as:

- High Power 4-pairs detection and power-up algorithm
- High Power 4-pairs port Matrix
- Extended power management
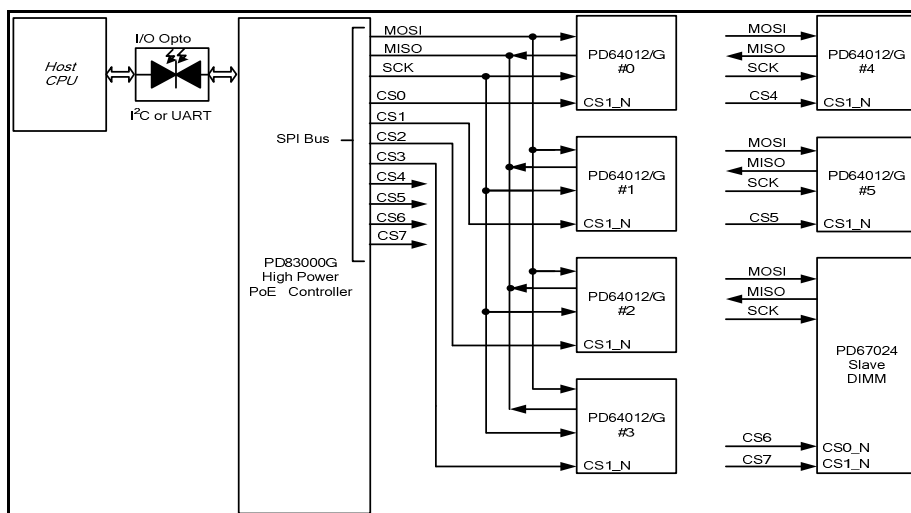- High Power 4-pairs - port statuses

Figure 2-4: High Power 4-pairs Mode

The High Power 4-pairs software supports the following features:

- Supports up to 48 ports (up to 8 PD-64012/G Devices), refresh interval is less than two seconds
- System measurements including: power consumption, voltage and current
- Port measurements including:
  - Status (on, off, power management, overload) per port
  - Power consumption [W] per port
  - Current [mA] per port
  - Class per port (0-4)
  - Enable / disable per port
- Automatic detection of connected devices (number of ports)
- Displays GUI version and PoE Controller's software version
- Line Detection Algorithms:

  - IEEE 802.3af

- Pre IEEE 802.3af Standard
- High Power 4-pairs (using Pre Standard IEEE 802.3at detection algorithm)
- Power management: Set system power budget, set power banks
- System Reset
- Restore Default Parameters
- Save system Parameters
- Vmain limits setting
- Interrupt status, Interrupt masking
- Device temperature, temperature alarm setting
- Ports priority setting
- Logical/Physical port matrix view

The Demo board has the following functions, as specified in the IEEE 802.3af-2003 standard:

- Line detection
- Powered device (PD) classification
- Power up
- Output ports AC or DC disconnection

Chapter 3 - Installation

3.1 Application Requirements

In order to fully evaluate the board's capabilities, it is recommended that the software package provided with the Evaluation Board is used. The software allows for communication from the PC to the Evaluation Board, via the RS-232 communication channel or I²C Refer to the Serial Communication Protocol User Guide, catalog number 06-0032-056, for programming instructions.

The minimum requirements for the PC are as follow:

- Pentium 166 MHz (running on a Windows 98 or 2000 or XP platform)
- 64 MB of RAM
- 16-bit color display (1024x768)
- CD-ROM drive
- 40 MB of free hard disk space

3.2 Hardware Setup

Interconnect the equipment as shown in figure 3-1. Make sure that the power supply is not energized when performing the connections. The power supply required for testing is to operate at 48 volts (nominal) and should be limited to 20A. The PC – Evaluation board I^{2}C adapter cable is supplied with the kit.
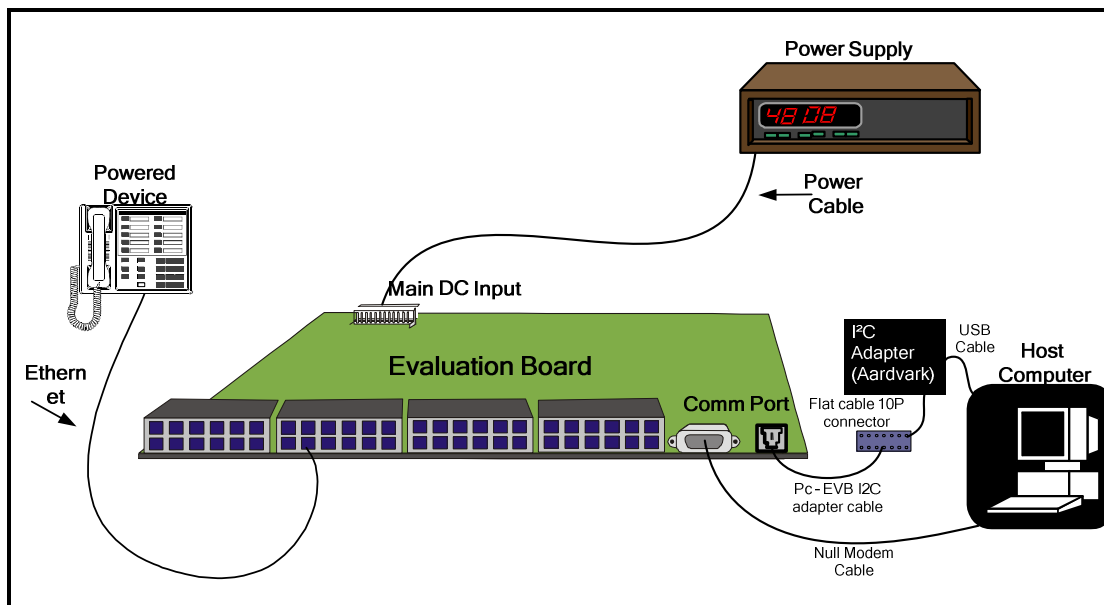
Figure 3-1: Setup

3.3   Software Installation

(see Figure 3-2)

1. Insert the CD provided with the Kit to the CD drive.

2. Uninstall the previous GUI version if exists.

3. Run Setup.exe to install the GUI.

Figure 3-2: Setup Wizard

4. Click **Next**, **Install** and **Finish** sequentially.

5. Installation procedure is complete.

Required Software:

Microsoft .NET Framework Version 2.0 Redistributable Package

For Microsoft .NET Framework Version 2.0 Redistributable Package (x86)

http://www.microsoft.com/downloads/details.aspx?FamilyID=0856EACB-4362-4B0D-8EDD-AAB15C5E04F5&displaylang=en

For Microsoft .NET Framework Version 2.0 Redistributable Package (x64)

http://www.microsoft.com/downloads/details.aspx?familyid=B44A0000-ACF8-4FA1-AFFB-40E78D788B00&displaylang=en

Windows Settings:

The GUI is best viewed using DPI setting to Normal size (96 DPI).

Chapter 4 - Enhanced Mode Operation

4.1   General

This chapter provides a detailed description of the Enhanced mode.

The mode supports Microsemi™ Enhanced mode controller – PD63000 and PD69000.

PoE devices are as follows:

- IEEE802.3af standard ICs (AF ICs) - PD64012/G/GH, PD64004A/AH, PD69012 and PD69008
- IEEE802.3at standard ICs (AT ICs) - PD64012GH, PD64004AH, PD69012 and PD69008

4.2   Initialization

1   Adjust the power supply for 48 volts and apply power to the connected Evaluation Board.

2   Run the application by clicking on the ![PoE Manager] : the Parameters initialization screen, followed by the *Opening Enhanced Mode* Main screen appears (see Figure 4-2), with the status bar displaying '*"I²C" + Rate or "UART" + Com number'* and '*Online'* at the bottom of the screen:
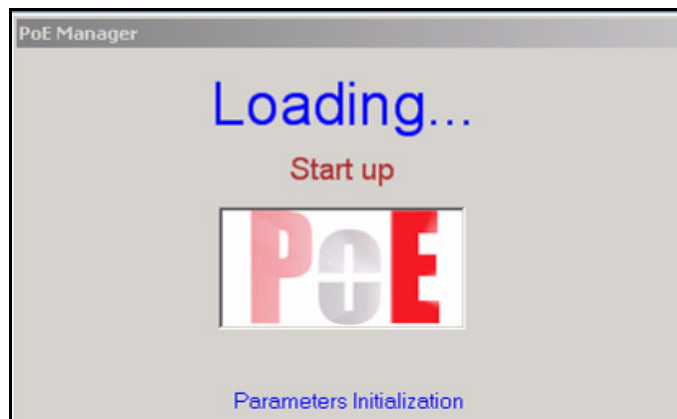
Figure 4-1: Startup Screen
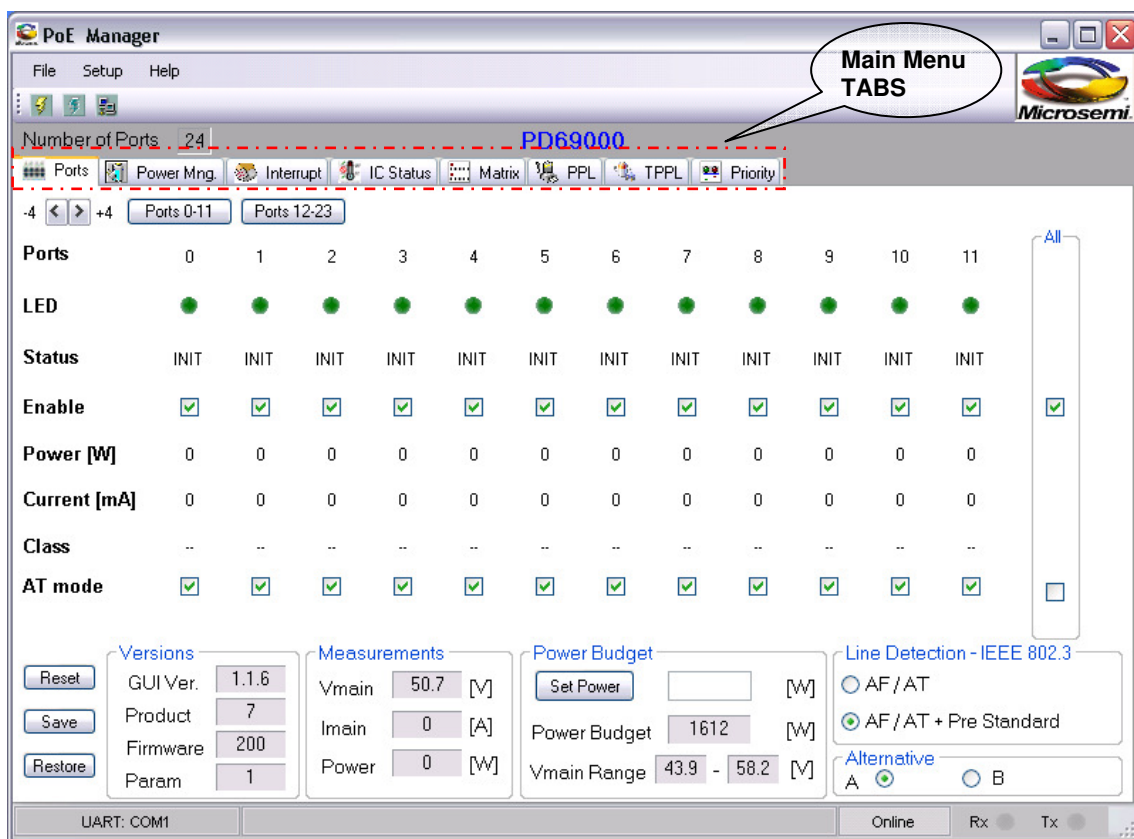
Figure 4-2: GUI Main Screen

3   If the open communication operation fails (or the user wishes to modify the Communication parameters manually) – Communication Setting dialog window opens (see Figure 4-3), allowing setting of the connected COM port and the I^2C parameters; The following screen appears:
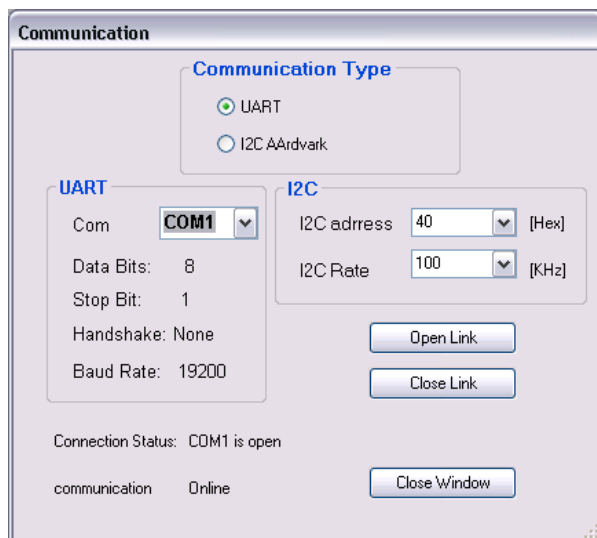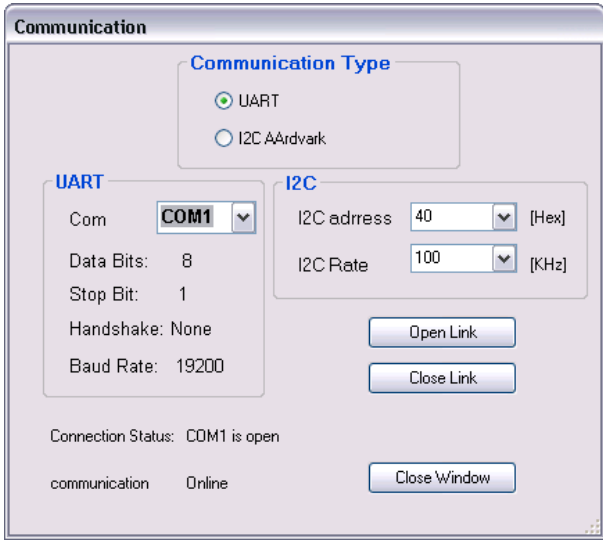
Figure 4-3: Communication Dialog Screen

4.3 Enhanced Mode Main Screen
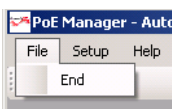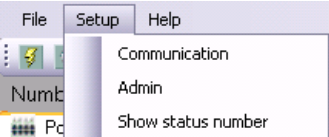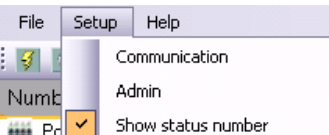
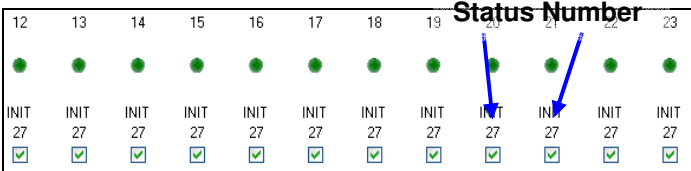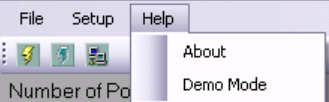The GUI Main screen (see Figure 4-2) appears when the Ports tab is selected. This screen comprises **Main Menu TABS** used to select the desired function, **Port Status Indicators**, indicating ports status, **Status and Port Enable checkboxes** used to enable port/s, **Power, Current, Class Measurements Field** displays measurements taken on the input power line such as: voltage, current and calculated power. The GUI's main screen includes buttons, indicators and combo-boxes:

4.3.1 Main screen Buttons

Button	Description
Number of Ports 24	Displays the total number of ports detected by the GUI software.
⚡	Clicking this button connects to the board.
⚡	Clicking this button disconnects from the board.
🖥️	When clicking the Communication button, the Communication screen appears, allowing the user to modify the desired communication parameters.
Rx ● Tx ●	Communication Indicators: blinking when the PC communicates properly in both directions (Tx and Rx). Refresh rate depends on the number of components that should be updated. Refresh interval is between 0.5 to 2 seconds.

4.3.2 Main Screen Menu Options

Name	Function
File	
	Clicking on the End option, exits the GUI Program.
	When selecting the Admin option, a Login screen appears, prompting the user to enter a password, so as to enter the Administrator password.
	When selecting the Show Status Number option, an additional field appears, showing a number representing the status description.
	The user may select either the Demo mode (inactive screen),or exit the Demo mode (return to active screen).
	When selecting the About option the About screen appears,

4.3.3 Main Menu Tabs

Name	Function
Ports	Displays ports real-time monitoring, product number, GUI version, allows for setting of the detection method (AF/AT or AF/AT +Pre Standard) and allows the selection of the alternative option ('A' or 'B').
Power Mng.	Sets power budget, power banks, valid input voltage and presents real time measurements
Interrupt	Displays interrupt related information and masks
IC Status	Displays the current PD devices temperature and enables temperature alarm limit setting and the selection of the AT mode. The current HW version is also displayed.
Matrix	Displays Logical to Physical port associations.
PPL	Used to set Port Power Limit for all ports.
TPPL	Used to set the temporary Port Power Limit for all ports.
Priority	Used for priority setting for all ports.

4.3.4 The Ports Tab

The screen shown in Figure 4-6 is accessed by clicking the Port Status tab.
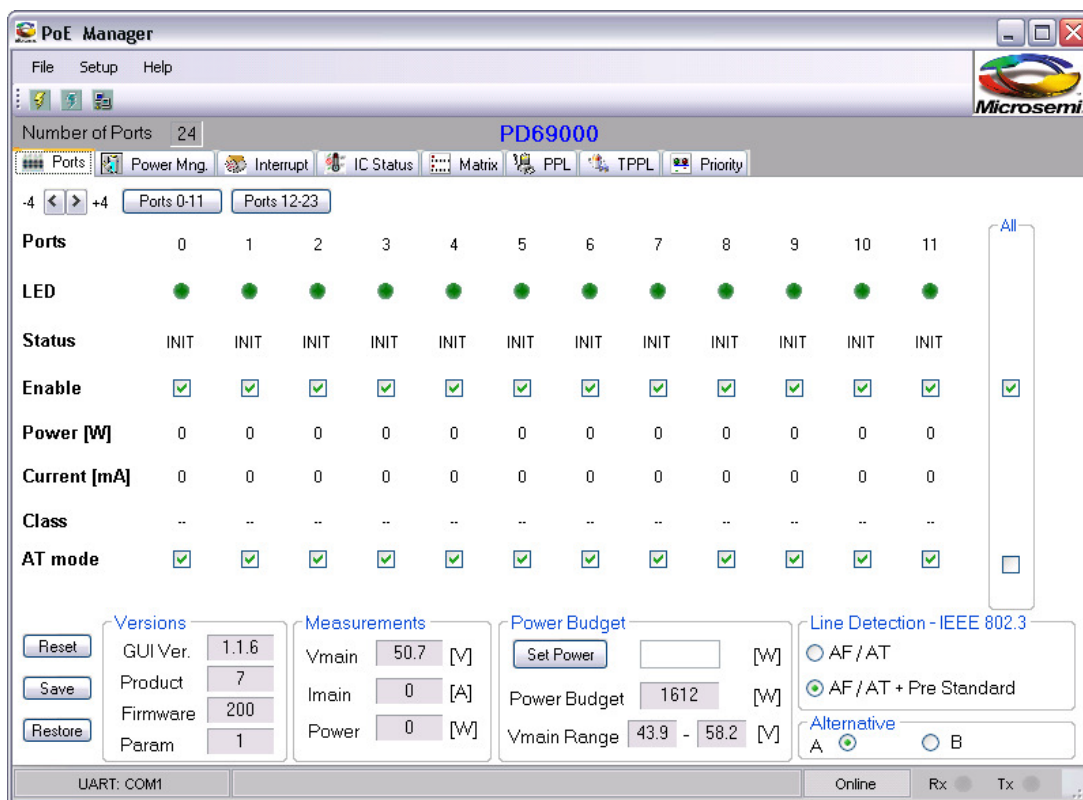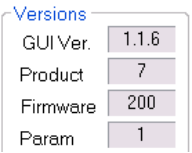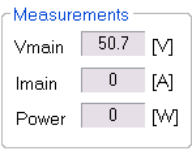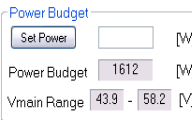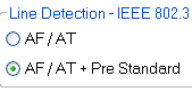
Figure 4-4: Ports Tab - Main Screen

Name	Function
Ports 0-11 Ports 12-23	Used to navigate between ports 0-11 display or ports 12-23 display etc.
-4 < > +4	Allows the user to increment (+4) /decrement (-4) the ports displayed in the "Ports" raw.
Port#	Ports number: the ports are physically defined from 1 to 12, but their logical designation is from '0' to '11', depending on the number of PoE Managers in the system.

LED	LED – This multi-color indicator indicates the port status as follow:
	    ▪ Green = Port operational
	    ▪ Dark Green = Port Off
	    ▪ Yellow = Overload condition
	    ▪ Yellow blinking = Port is off due to power management

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Name	Function
Status	Indicates the actual ports status. Common statuses are as follows: - OFF - ON - INIT - Overloaded (OVL) - Power managed (PM)
Enable	Enabled/disabled ports by checking/unchecking the desired checkbox, either individually, or all (ic's chip ports) at once by checking the ALL checkbox.
Power	Power consumed by a single port
Current	Current consumed by a single port
Class	The PSE (PoE device) determines the PD class during the interrogation stage. The class is displayed as a number from 0 to 4.
AT Mode	Enables the device's AT operation mode: Checked: AT operation. Unchecked: AF operation
Reset	When clicked, resets the PoE Controller and the PoE devices and restarts the GUI operation..
Save	Saves current configuration parameters to the PoE Controller's non-volatile memory.
Restore	Restores factory defaults parameters and restarts the GUI operation.

Name	Function
Versions GUI Ver. 1.1.6 Product 7 Firmware 200 Param 1	Displays the GUI Version, product version PoE Controller's Software Version and parameters version.
Measurements Vmain 50.7 [V] Imain 0 [A] Power 0 [W]	▪ Vmain – Main Input Voltage ▪ Imain – Total Input Current ▪ Power – Total Power consumption
Power Budget Set Power [W] Power Budget 1612 [W] Vmain Range 43.9 - 58.2 [V]	**Set Power button** - Sets a Power limit; Allowable limits are from 37W to 2000W. Otherwise, an error message appears: (Note: The GUI allows the user to set power budget from 0 to 65535. In Cases where power is out of range – the PoE CPU will reply with an error message.) Program Message Set Power Operation failed Range is 0 - 65535 OK **Power Budget** - Displays the power budget. **Vmain Range** - Displays the Main input voltage ranges.
Line Detection - IEEE 802.3 ○ AF / AT ⦿ AF / AT + Pre Standard	The user may select the desired Line Detection Method: ▪ AF/AT ▪ AF/AT + Pre Standard (Capacitor Detection)
Alternative A ⦿ ○ B	**Backoff Time:** Selects one of two valid four wire connections : Alternative A - PSE is powering over data lines (1,2 and 3,6) Alternative B - PSE is powering over spare lines (4,5 and 7,8)

4.4   Power Management Tab

The Power Management Screen, shown in Figure 4-5, appears when the Power management Tab is selected. The Power Management screen enables the setting of the desired output power, viewing of Real Time Measurements and on-line consumed power and setting of the Calculated Power Mode.
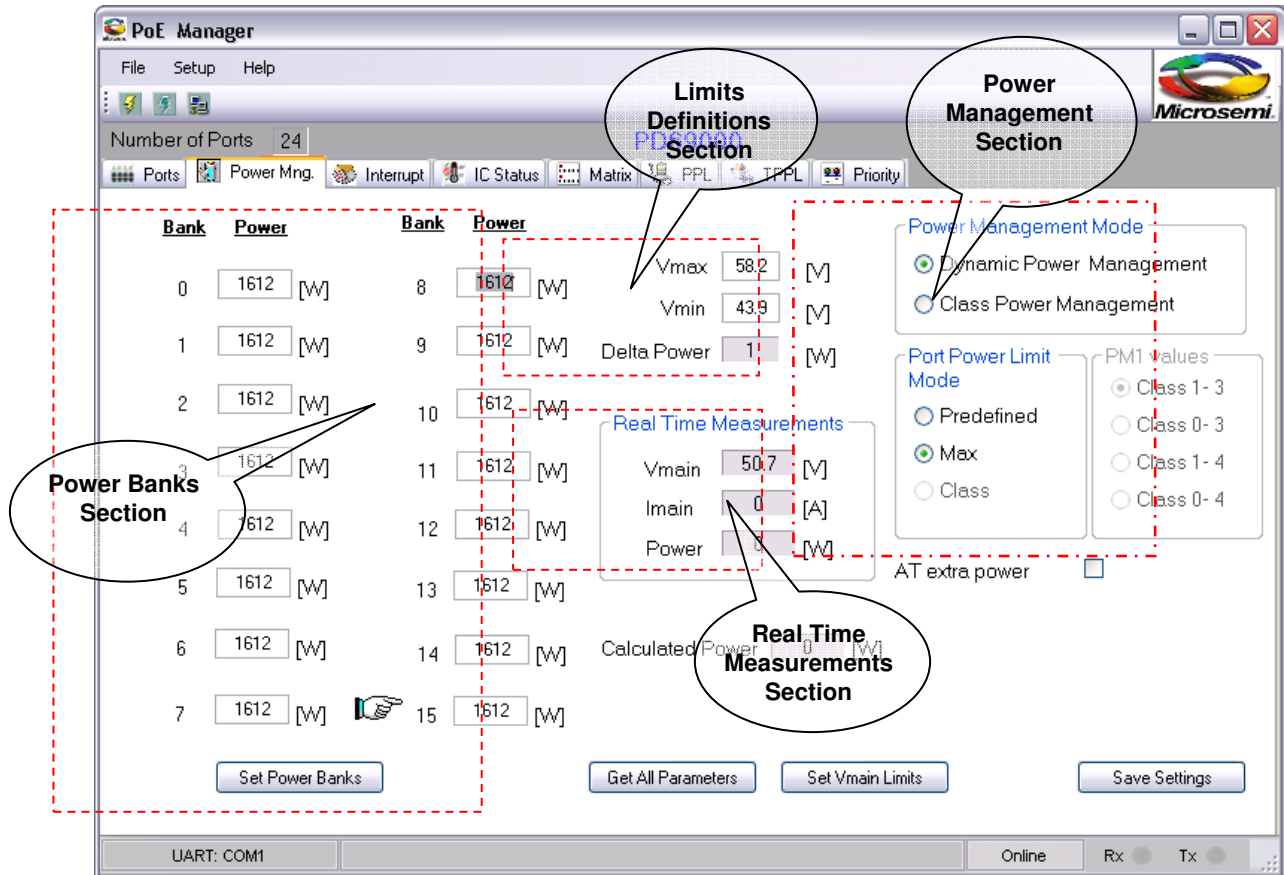
Figure 4-5: Power Management Screen

Name	Function
Power Banks	Total output Power allowable: • Displays the selected power bank • Setting of allowable power per bank; each bank may be set to a different power value
Limits Definitions	Vmax: Upper limit for input voltage Vmin: Lower limit for input voltage Delta Power - range in which no additional ports can be connected

Name	Function
Real-Time Measurements	Display of Real-Time current, voltage, and power: **Vmain –** Actual input line voltage **Imain –** Total current consumption **Power –** Total power used (Vmain x Imain)
AT extra power ☐	When checked the MCU provides the extra power regardless of port configuration
Power Management	Sets the desired Power mode for power management purposes: ▪ **Dynamic Power Management** – Predefined or Max modes ▪ **Class Power Management -** Max or Class modes
Calculated Power [0] [W]	The sum of all ports power, allocated by the IEEE standard 802.3af-2003, or actually consumed, according to Calculated Power Management Mode
Power Management Mode ⦿ Dynamic Power Management ◯ Class Power Management	Allows the user to select either Dynamic Power Management or Class Power Management.
Port Power Limit Mode ◯ Predefined ⦿ Max ◯ Class	Allows the user to select the desired Power Limit mode: **Predefined, Max, Class**
Buttons	[Set Power Banks] – Sets specified power budget to power banks [Get All Parameters] – Gets power bank's budget and and limits definitions values. [Set Vmain Limits] - Sets Vmax and Vmin values. [Save Settings] – Saves all current configuration parameters to the PoE Controller's non-volatile memory.

4.5 Interrupt Tab

The Interrupt Screen shown in Figure 4-6 appears when the Interrupt Tab is selected.

The Interrupt screen enables definition of interrupt masks and viewing of interrupt statuses.
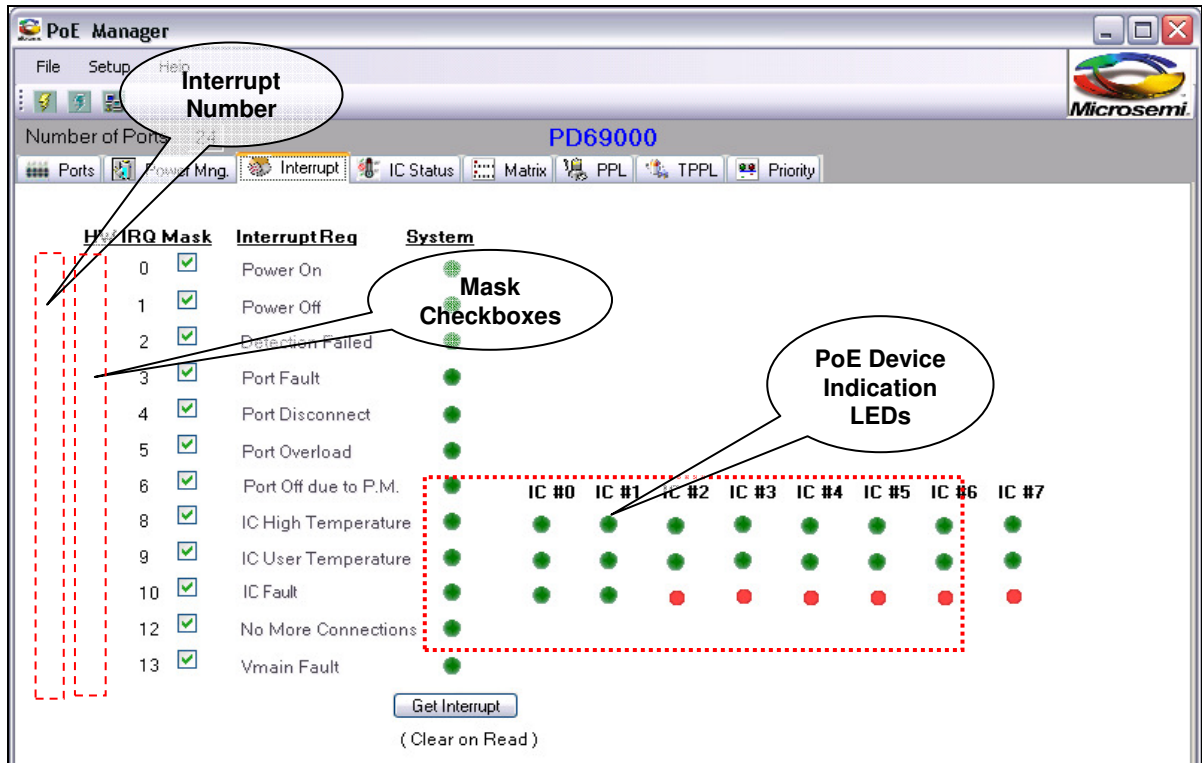

Figure 4-6: Interrupt Screen

The Interrupt Screen includes the following:

Name	Function
Interrupt Number	Indicates the event bit
Interrupt Mask Checkboxes	Masks the relevant event's request of the PoE Controller when checked.
Interrupt Reg row	Provides description of each Interrupt event.
System	Bright Green LEDs indicates that an interrupt event has occurred.
Get Interrupt	Displays Interrupt events status; GREEN LED= no event. RED LED= event occurred. To enable this feature, the corresponding interrupt mask checkbox (see above) should be checked. Upon LEDs refreshment, the CPU zeroizes the event register since the register is of the 'clear on read' type.
ICs Interrupt Indication LEDs	Indicates the specific PoE device that caused the event (bits 8 to 10); Red LED means IC fault, while Green LED means valid IC.

4.6   IC Status Tab

The IC status Screen, shown in Figure 4-7:appears when the IC status Tab is selected.

Each PoE device incorporates two or four temperature sensors, measuring the junction temperature.

The PoE Devices include over-temperature limit setting allowing the Host CPU to receive a relevant over-temperature indication.

The screen has AT mode checkboxes allowing the user to set the chip mode to AT when checked , or to AF mode when unchecked.

In cases where the hardware is not an AT compliant, any attempt to set the chip to AT mode will be denied by the program.
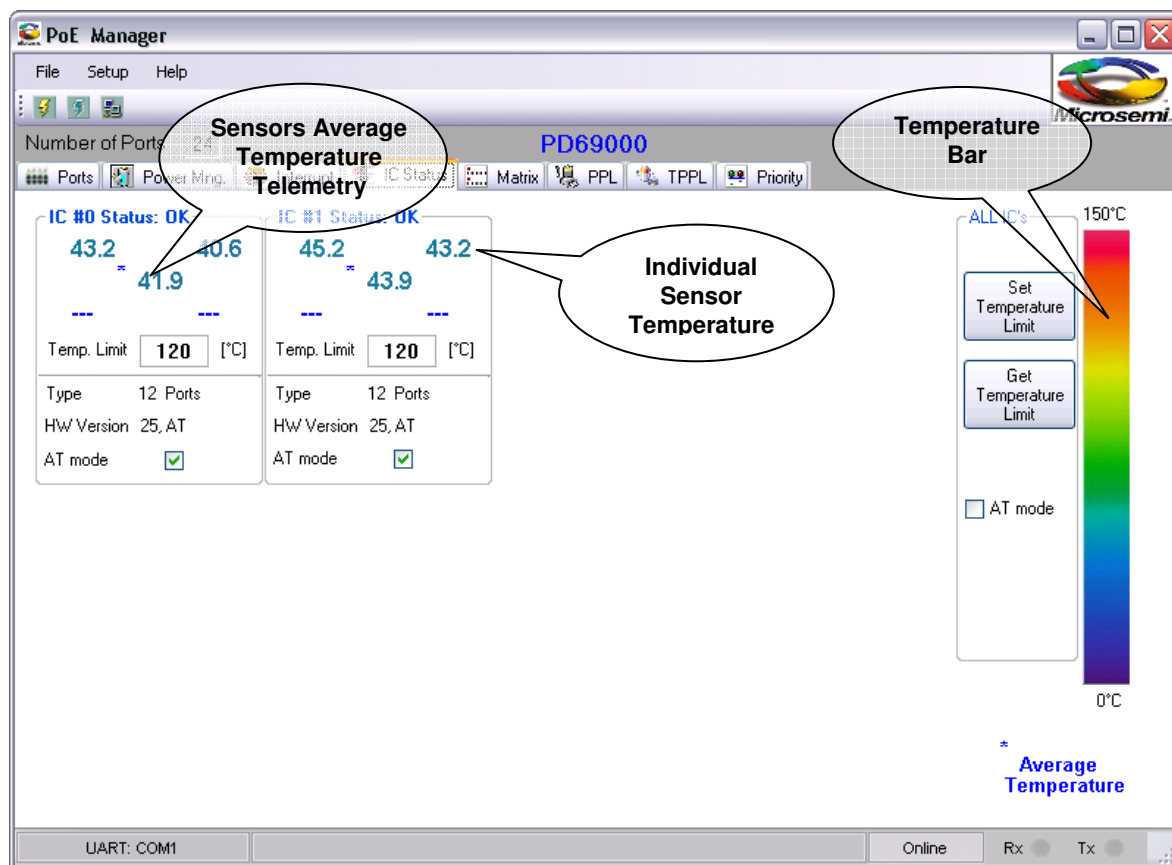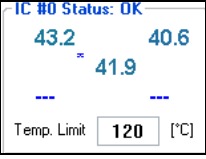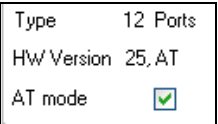

Figure 4-7: IC Status Screen

Name	Function
IC Number and Status IC #0 Status: OK	Status display providing the PoE device number and current status (OK ,ERR, etc).
Temperature Telemetry IC #0 Status: OK 43.2 40.6 41.9 --- --- Temp. Limit 120 [°C]	**Per IC temperature sensors** - providing the relevant IC temperature and average temperature. **Temperature font color** – changes its color in accordance with the actual temperature. **Temp. Limit** – The user can set a temperature limit of each PoE Device. If it exceeds this limit, the PoE Controller sends an interrupt to the Host CPU.
IC Info. and Setting Type 12 Ports HW Version 25, AT AT mode ☑	• **Type** – PoE device's number of ports • **HW Version** – PoE device current Hardware Version • **AT mode -** Device AT operation request and status: - Checked: AT operation. - Unchecked: AF operation.
Set Temperature Limit	Sets the user temperature limits when clicked.
Get Temperature Limit	Gets the user temperature limits when clicked.
Temperature Bar	A color legend that represents the temperature value corresponding to the temperature font color.

4.7   Matrix Tab

The Matrix screen, shown in Figure 4-8: appears when the Matrix Tab is selected. The Matrix screen is used to view the System's Ports configuration– Logical Ports, in accordance with the physical ports. The Matrix Screen allows the user to set the physical port by manually selecting it from the dropdown window.
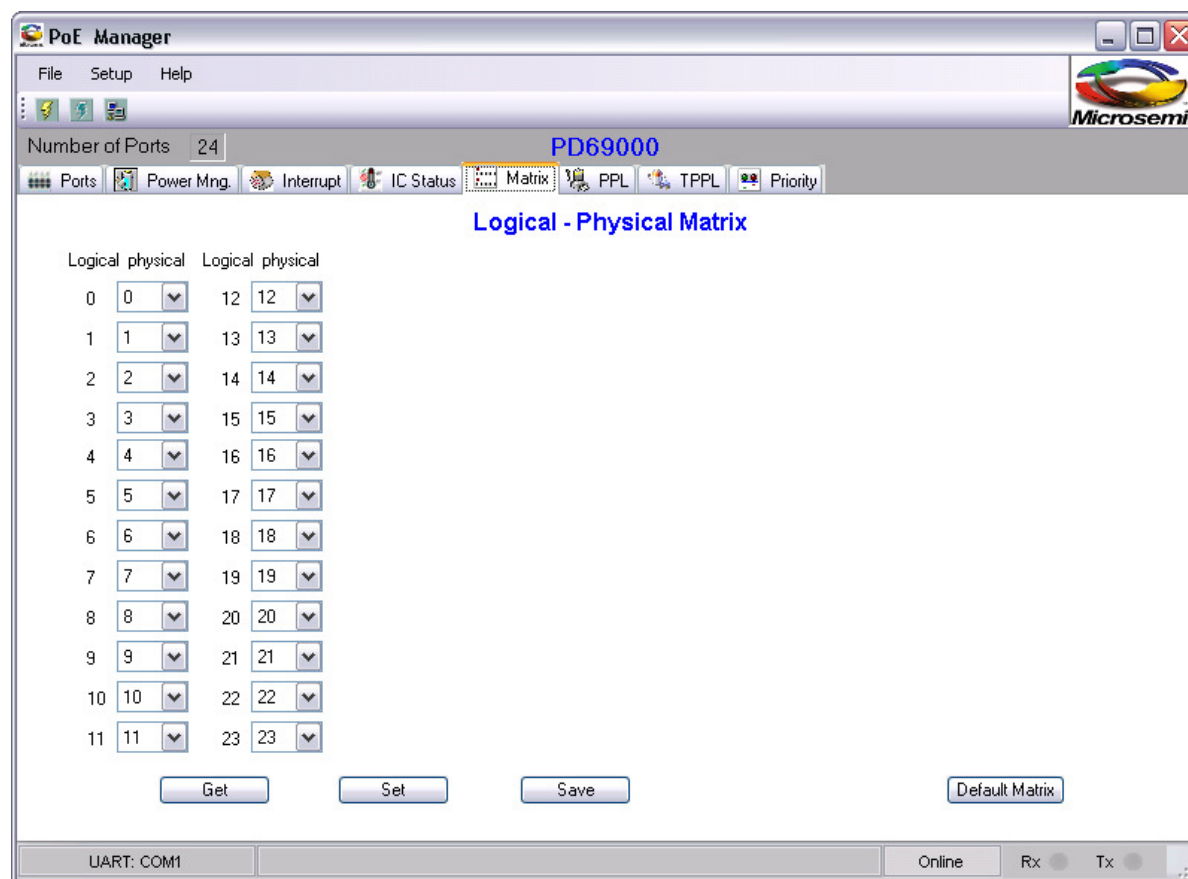

Figure 4-8: Matrix Screen

Name	Function
Set	Sends the user-selectable logical - physical matrix to the PoE Controller.
Get	Reads the logical - physical matrix from the PoE Controller.
Save	Saves current configuration parameters to the PoE Controller's non-volatile memory.
Default Matrix	Sets all of the combo boxes states to 'one-to-one' physical to logical connection.

4.8 Port Power Limit Tab

The Port Power Limit Screen shown in Figure 4-9: appears when the Port Power Limit Tab is selected. The Port Power Limit screen allows the user to set (manually) of the power limit per each port.
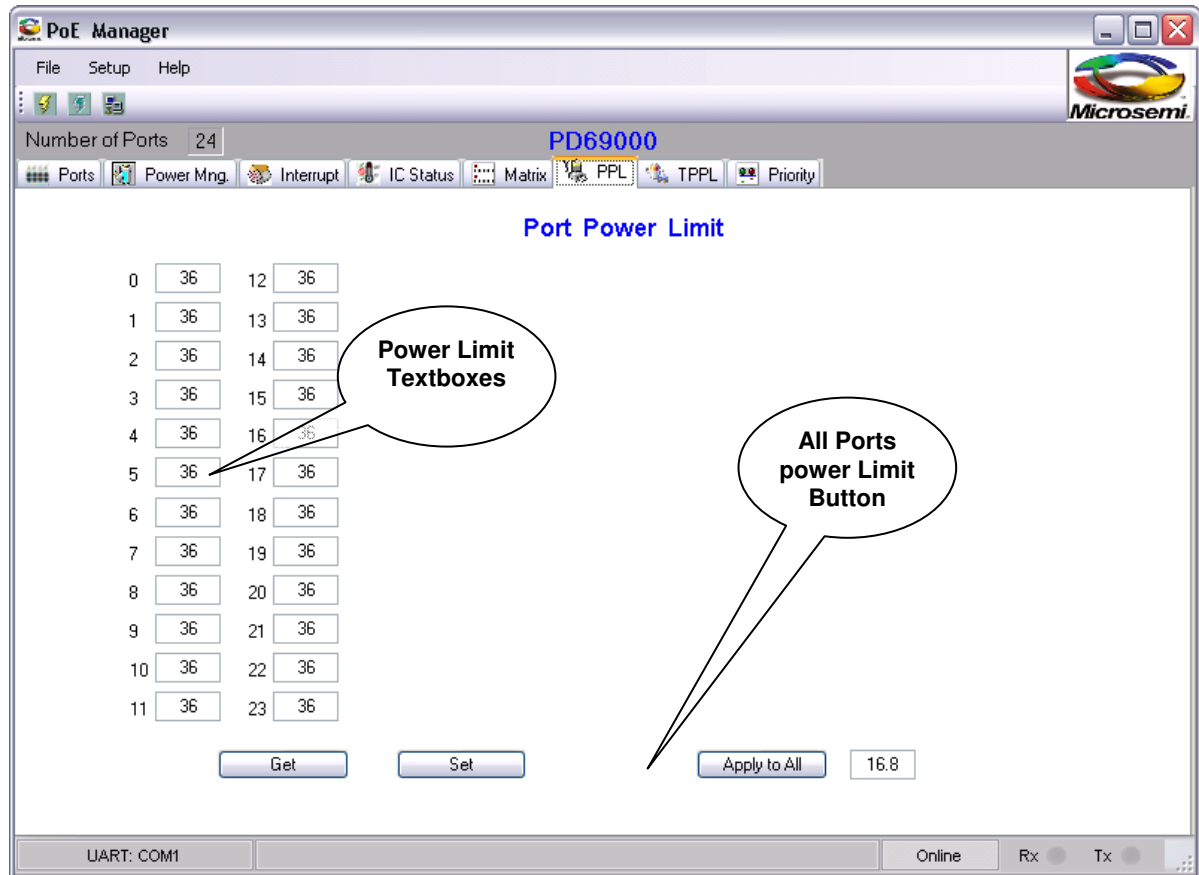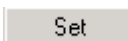

Figure 4-9: Port Power Limit Screen

Name	Function
Get	Gets power limits values from the PoE Controller.
Set	Sets all power limits as typed in the power limit text box to the PoE Controller
Apply to All 16.8	Sets all port power limits text boxes values to the value typed in the general power limit text box.

4.3.2.1 Temporary Port Power Limit Tab

The Temporary Port Power Limit screen shown in Figure 4-10: appears when the Temporary Port Power Limit Tab is selected. The Temporary Port Power Limit screen enables setting the Temporary power limit of each port.
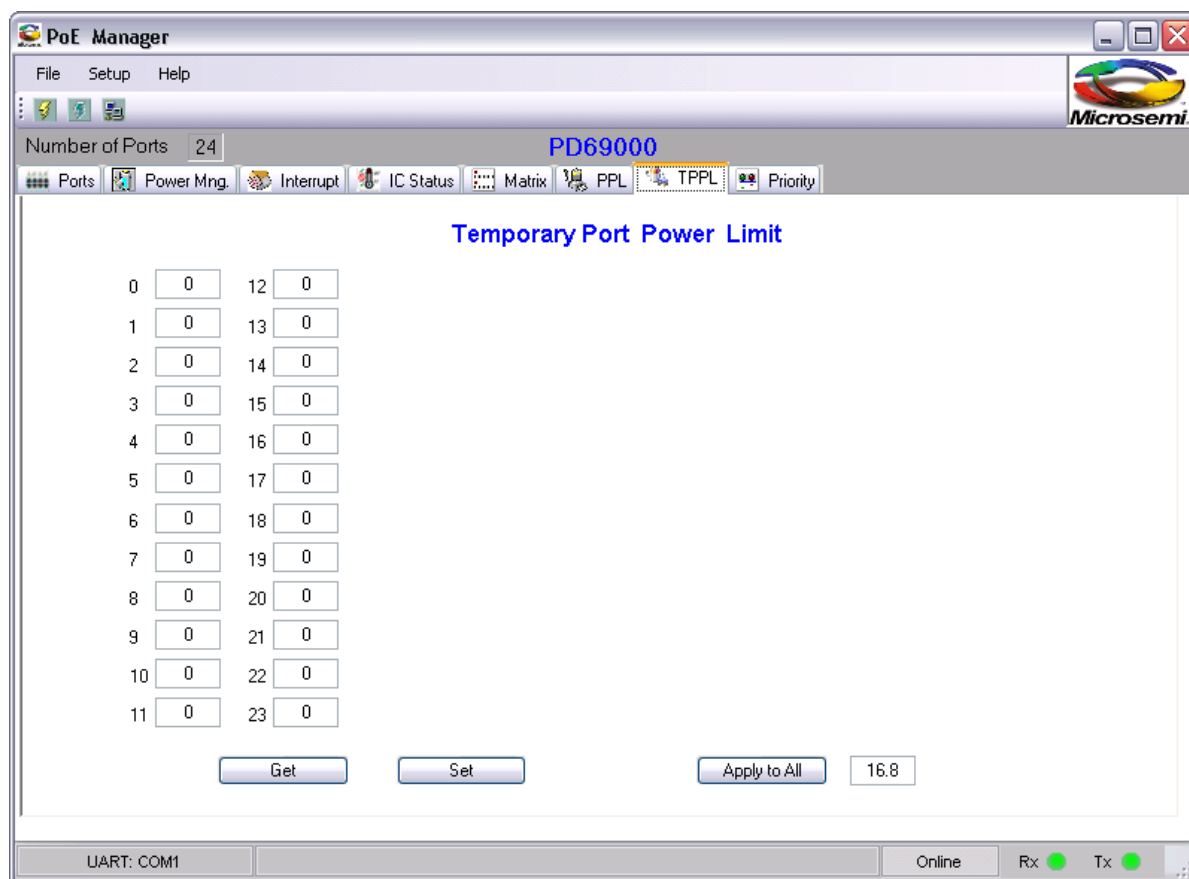

Figure 4-10: Temporary Port Power Limit Screen

Name	Function
Get	Gets power limits values from the PoE Controller
Set	Sets all power limits as typed in the power limit text box to the PoE Controller
Apply to All 16.8	Sets all port temporary power limits text boxes' values to the value typed in the general power limit text box.

4.9   Priority Tab

The Priority Screen shown in Figure 4-11 appears when the Priority Tab is selected. The Priority screen is used to set or get the ports priorities. The priority of each port may be set to each of the following options: Critical, High, Low.
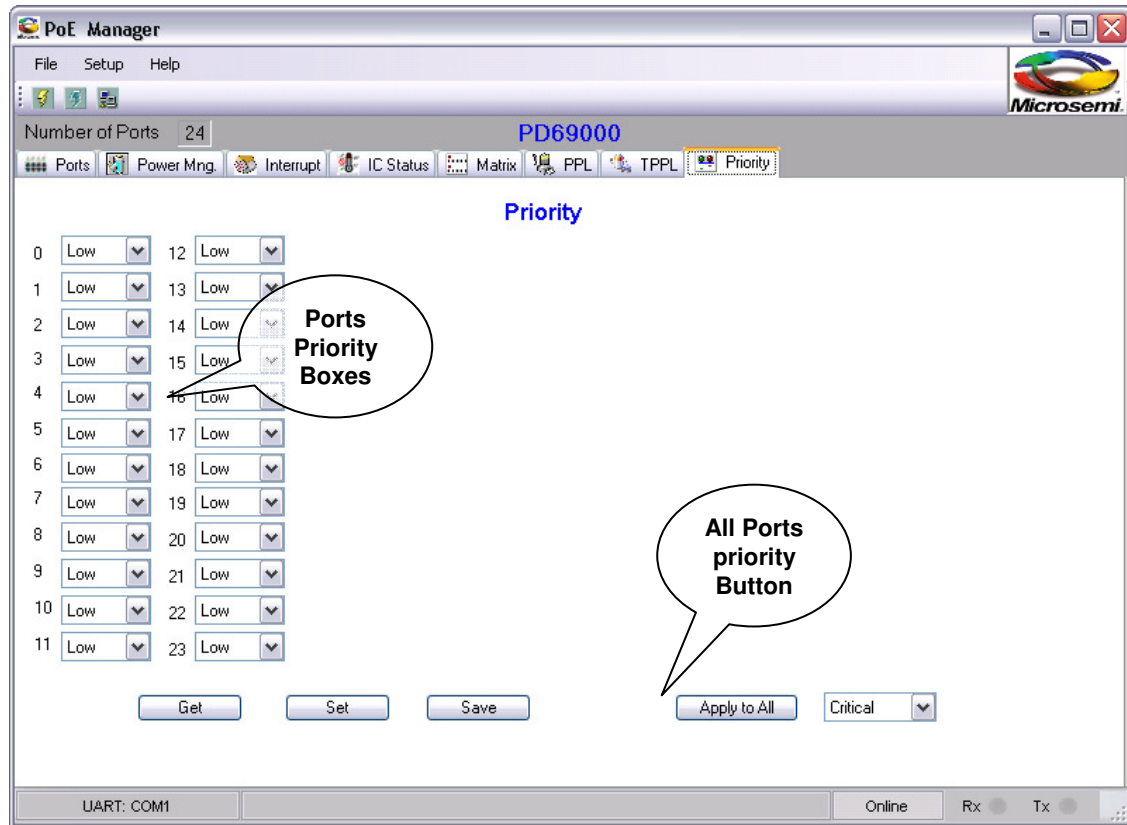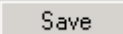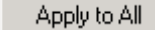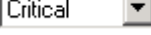

Figure 4-11: Priority Screen

Name	Function
Get	Gets the priority settings from the PoE Controller.
Set	Sets priority settings as typed in the dropdown window to the PoE Controller
Save	Saves current configuration parameters to the PoE Controller's non-volatile memory.
Apply to All Critical	Sets all ports priority boxes values to the value selected in the general Priority box/es.

Chapter 5 – PoE+ Mode Operation

5.1 General

This chapter provides a detailed description of the PoE+ mode:

5.2 Initialization

1 Adjust the power supply for 48 volts and apply power to the connected Evaluation Board.

2 Run the application by clicking on the [PoE Manager icon]: the Parameters initialization screen, followed by the *Opening PoE+ mode* Main screen appears (see Figure 5-1, Figure 5-2) with the status bar displaying '*"I²C" + Rate or "UART" + Com number'* and '*Online'* at the bottom of the screen:

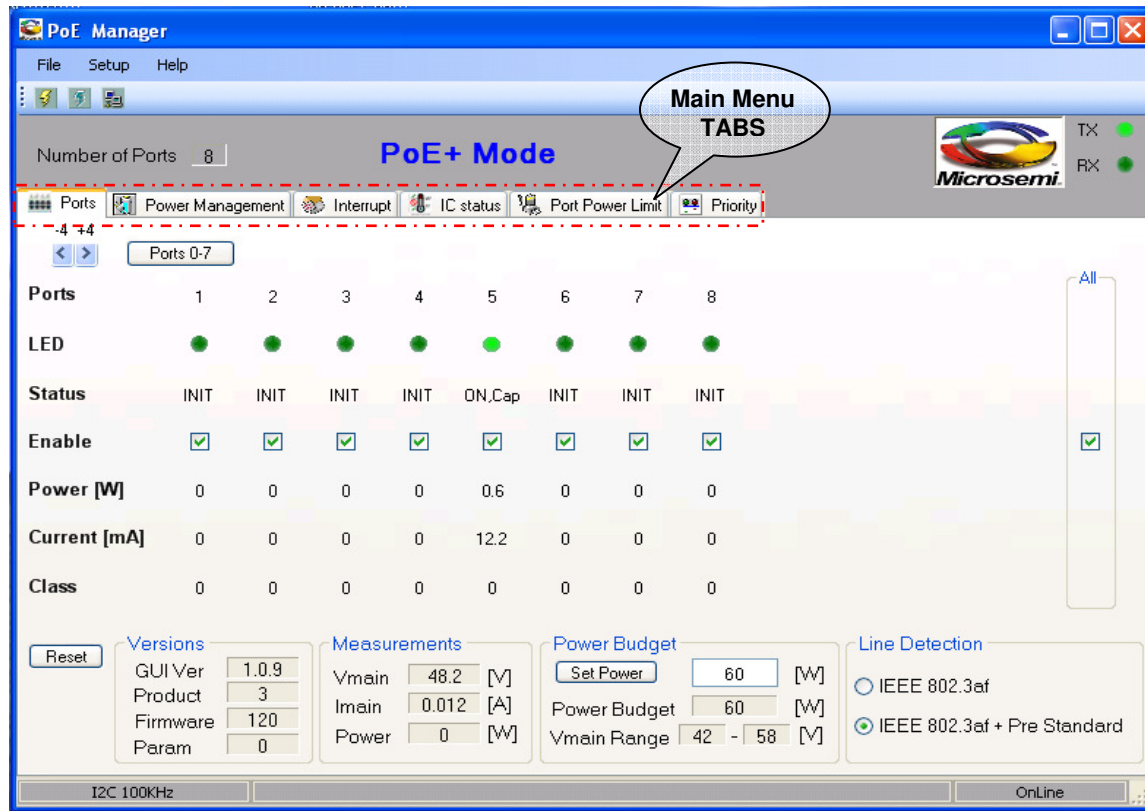**Figure 5-1: Startup Screen**

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Figure 5-2: Main Screen

3   If the open Link operation (see Figure 5-3) fails (or the user wishes to modify the Com port 's parameters manually) – Communication Setting dialog window opens, allowing setting of the connected COM port and the I^2C link parameters; The following screen appears:
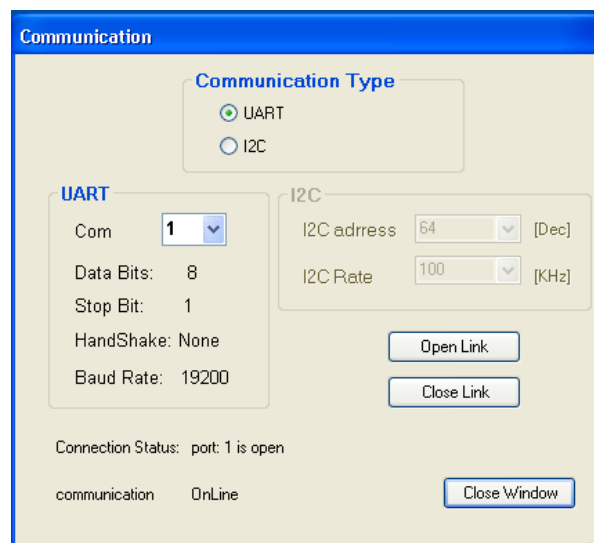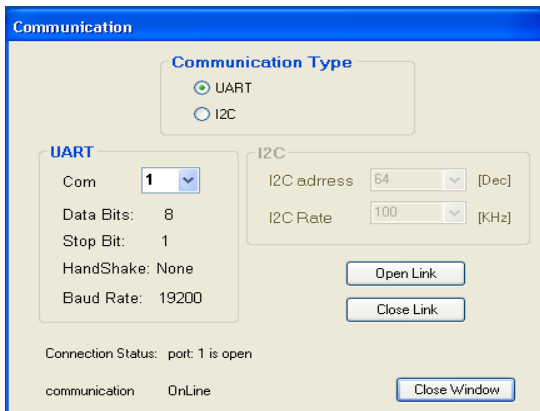

Figure 5-3: Communication Dialog Screen

5.3   PoE+ Mode Main Screen
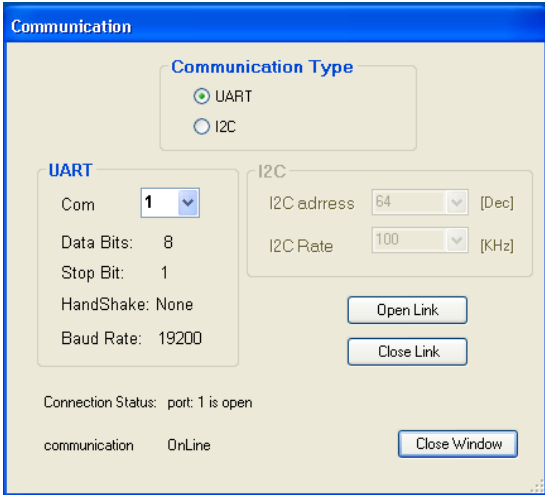
The screen shown in Figure 5-2 appears when the Ports tab is selected. This screen comprises **Main Menu TABS** used to select the desired function, **Port Status Indicators**, indicating ports status, **Status and Port Enable checkboxes** used to enable port/s, **Power, Current, Class Measurements Field** displays measurements taken on the input power line, such as: voltage, current and calculated power. The GUI's main screen includes the following buttons, indicators and combo boxes:

5.3.1   Main screen Buttons

Button	Description
	Clicking this button connects to the board
	Clicking this button disconnects from the board
	Clicking this button calls on the Communication Settings window:
	Clicking this button, opens the following S/W info screen:
TX: RX:	Communication Indicators: blinking when the PC communicates well in both directions (Tx and Rx). Refresh rate depends on the number of components to be updated . Refresh interval is between 1 to 3 seconds

5.3.2   Main Screen Menu Options

Name	Function
File	
End	Exits the GUI Program
Setup	
Communication	Opens a communication window: The user can select the desired PC Com-Port or I²C link for communication with the Evaluation Board and view its settings, or open or close a Link to the Evaluation board (Connect or Disconnect).
Show Status Number	Displays the Status Number below the Status row (when the "Ports" tab was selected).
Help	
About	button Identical to the
Demo mode	The user may select either the Demo mode (inactive screen),or exit the Demo mode (return to active screen).

5.3.3   Main Menu Tabs

Name	Function
Ports	Displays real-time monitoring of the system and ports
Power Management	Sets power budget, power banks, valid input voltage and presents real time measurements
Interrupt	Displays interrupt related information and masks
Temperature	Displays the current PD64012 devices temperature and enables temperature alarm limit setting
Port Power Limit	Maximum output power, per port.
Priority	Allows setting of the priority for all ports individually or all-at-once.
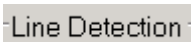
5.3.4   The Ports Tab

The LEDs indicate changes in port status as follow:

- ▪ Dark Green: Port Off
- ▪ Light Green: Port On
- ▪ Yellow : Port Overloaded or Shorted
- ▪ Yellow blinking : Port under Power Management

Name	Function
Ports Area	
Ports	Port Number – 0 up to 7
LED	Graphical LED, displaying the actual status of the relevant port (dark green=inactive port, light green=active port)
Status	Displays either one of the following: ON (`Cap,Res,Frc`), OFF, INIT (Initializing), OVL (Overload), UDL (Underload), P.M. (Power Management), ERR (Error), UnDef (Undefined), TEMP (Temperature), SHORT (Short-Circuit), VOUT (Supply Voltage not in range). For more details, refer to User Guide-PD33000B Serial Communication Protocol, Cat. Number 06-0031-056, Table 1: Actual Port Status
Enable	Port is enabled/disabled by operator, either individually or all at once by ticking off the ALL option button.
Power [W]	Display of the currently measured port Power
Current [mA]	Display of the currently measured port Current
Class	Display of the currently detected Port Class, in accordance with the IEEE 802.3af standard.

5.3.5   Data Functions

Name	Function
Reset	Resets the PoE Controller.
Set Power	**Set Power** button - Sets a Power limit, Allowable limits are 22W to 160W. Otherwise, an error message appears: **Program Message** ⚠ Set Power Operation failed Range is 0 - 255 [OK] **Power Budget** - Displays the power budget **Vmain Range** - Displays the Main input voltage ranges
Line Detection	The user may select the desired Line Detection Method: ▪ IEEE 802.3af ▪ IEEE 802.3af + Pre Standard

5.4 Power Management Tab

The Power Management screen, shown in Figure 5-4, appears when the Power Mng. Tab is selected.
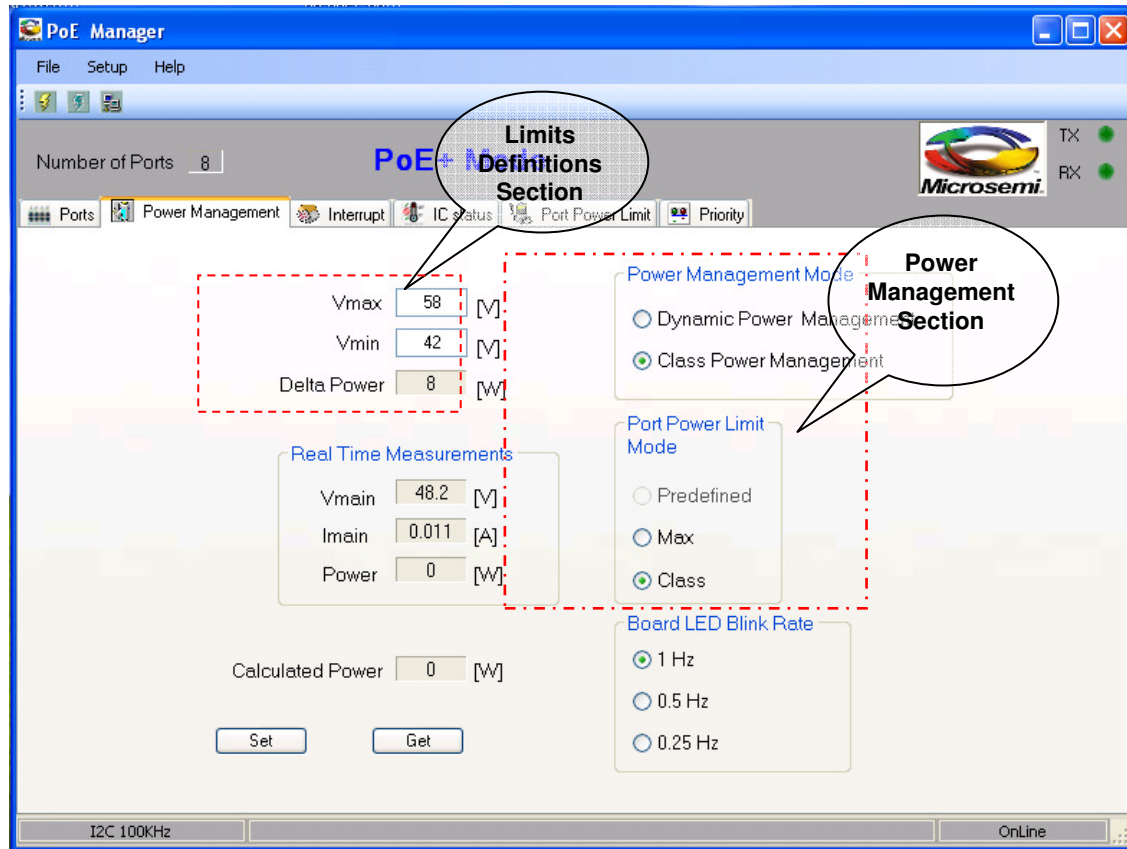

Figure 5-4: Power Management Screen

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Name	Function
Limits Definitions	**Vmax** - Upper limit for input voltage **Vmin:** Lower limit for input voltage **Delta Power** - – 19W constant limit (range in which no additional ports can be connected)
Real-Time Measurements	▪ **Vmain** – Actual input line voltage ▪ **Imain** – Current consumption ▪ **Power** – Total power used (Vmain x Imain)
Calculated Power	The sum of all ports power, allocated by IEEE standard 802.3af-2003 or actually consumed, according to Calculated Power Management Mode
Power Management	Sets mode of calculated power for power management purposes: **PM1 –** selects the total allocated power **PM2 –** selects the power limit at the port (Maximum or according to class) **PM3 –** Not applicable, always 0x00
Buttons	Set – Sets parameters into the PoE Controller Get – Obtains all relevant data for the PoE PoE Controller, regarding Power Management
Board LED Blink Rate ● 1 Hz ○ 0.5 Hz ○ 0.25 Hz	Sets the desired LED blinking rate in PM state

Power Management table:

	PM Mode		Management Mode	Cat Ref	Total Allocated Power	Port Power Limit
	PM-1	PM-2	PM-3			
	0x00	0x02	0x00	Dynamic	D	Consumption	Max.
	0x00	0x00	0x00	Static	S	Consumption	Predefined
Default ->	0x01	0x01	0x00	Class	C1	Class	Class
	0x01	0x02	0x00		C2	Class	Max.

5.5   Interrupt Tab

The Interrupt screen shown in Figure 5-5 appears when the Interrupt Tab is selected.

The Interrupt screen enables definition of interrupt masks and viewing of interrupt statuses.
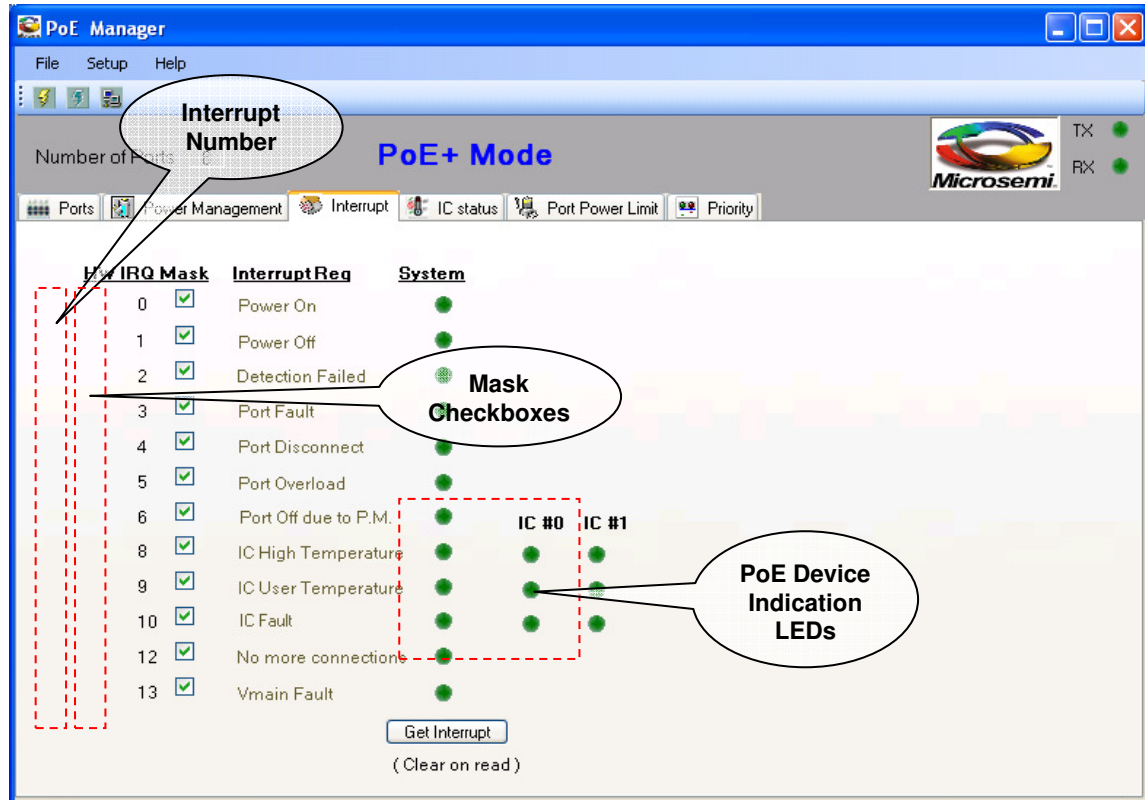
Figure 5-5: Interrupt Screen

The Interrupt Screen includes the following:

Name	Function
Interrupt Number	Indicates event bit
Interrupt Mask Checkboxes	Masks the relevant event's request of the PoE Controller
Interrupt Reg	description of each Interrupt event
System	Bright Green LEDs indicates that an interrupt event has occurred
Get Interrupt	Refreshes the status of the Interrupt Events. Upon LEDs refreshment, the CPU zeroizes the event register
ICs Indication of Interrupt LEDs	Indicates the specific PoE device that caused the event (bits 8 to 10)

5.6   IC status Tab

The IC status Screen, shown in Figure 5-6 appears when the IC status Tab is selected. Each PoE device incorporates two sensors, measuring the junction temperature. The PoE Devices include over-temperature limit setting to allow the Host CPU to receive a relevant over-temperature indication.
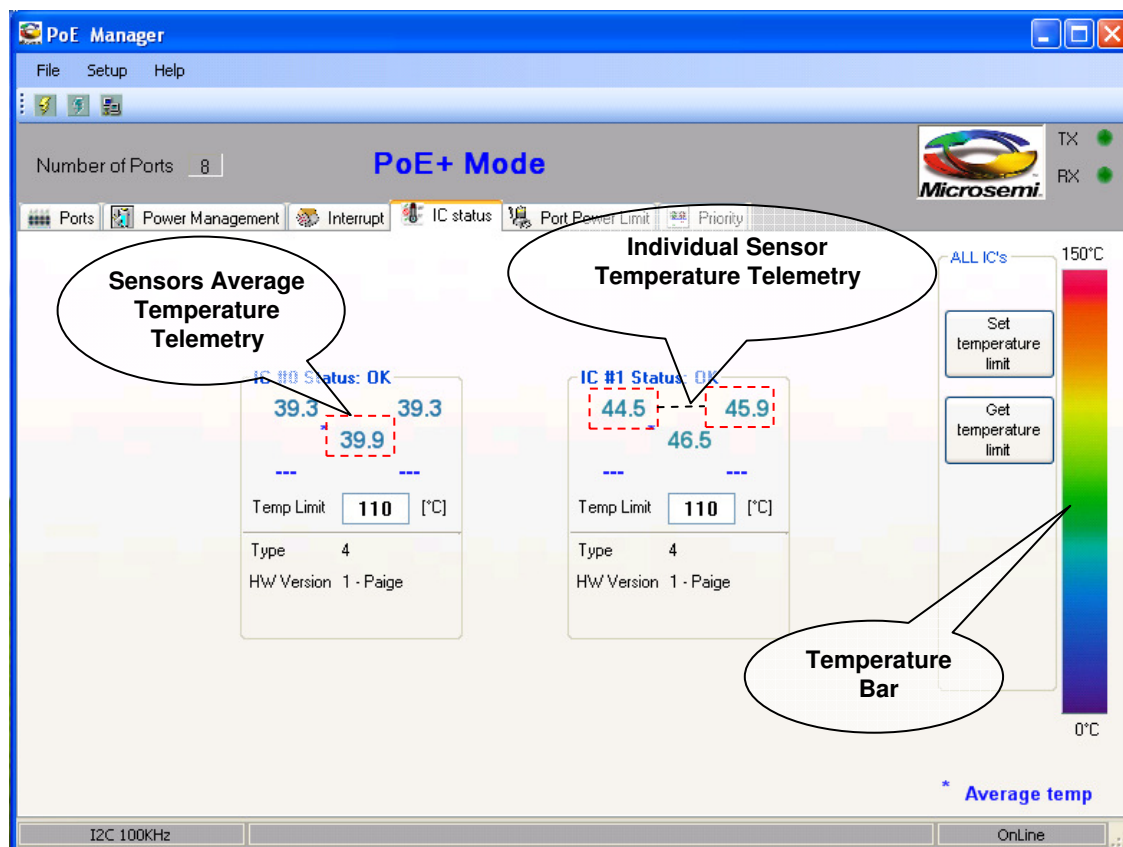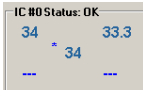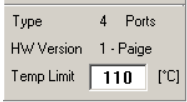
Figure 5-6: IC Status Screen

Name	Function
IC Number and Status IC #0 Status: OK	• PoE Device number: two ICs Status: OK, ERR
Temperature Telemetry IC #0 Status: OK 34 33.3 * 34 --- ---	• Two individual temperature sensors per IC • Average IC Temperature Temperature font Color – corresponds to the actual temperature
IC Info. and Setting Type 4 Ports HW Version 1 - Paige Temp Limit 110 [°C]	• Type – PoE device's number of ports • HW Version – PoE device Hardware Version • Temp. Limit – The user can set a temperature limit of each PoE Device. If it exceeds this limit, the PoE Controller sends an interrupt to the Host CPU.

Name	Function
Get Temperature Limit button	Gets the user temperature limits when clicked.
Set Temperature Limit button	Sets the user temperature limits when clicked.
Temperature Bar	A color legend that represents the a temperature value color corresponding to the temperature font color

5.7   Port Power Limit Tab

The Port Power Limit screen shown in Figure 5-7, appears when the Port Power Limit Tab is selected. The The Port Power Limit screen enables setting the power limit of each port.
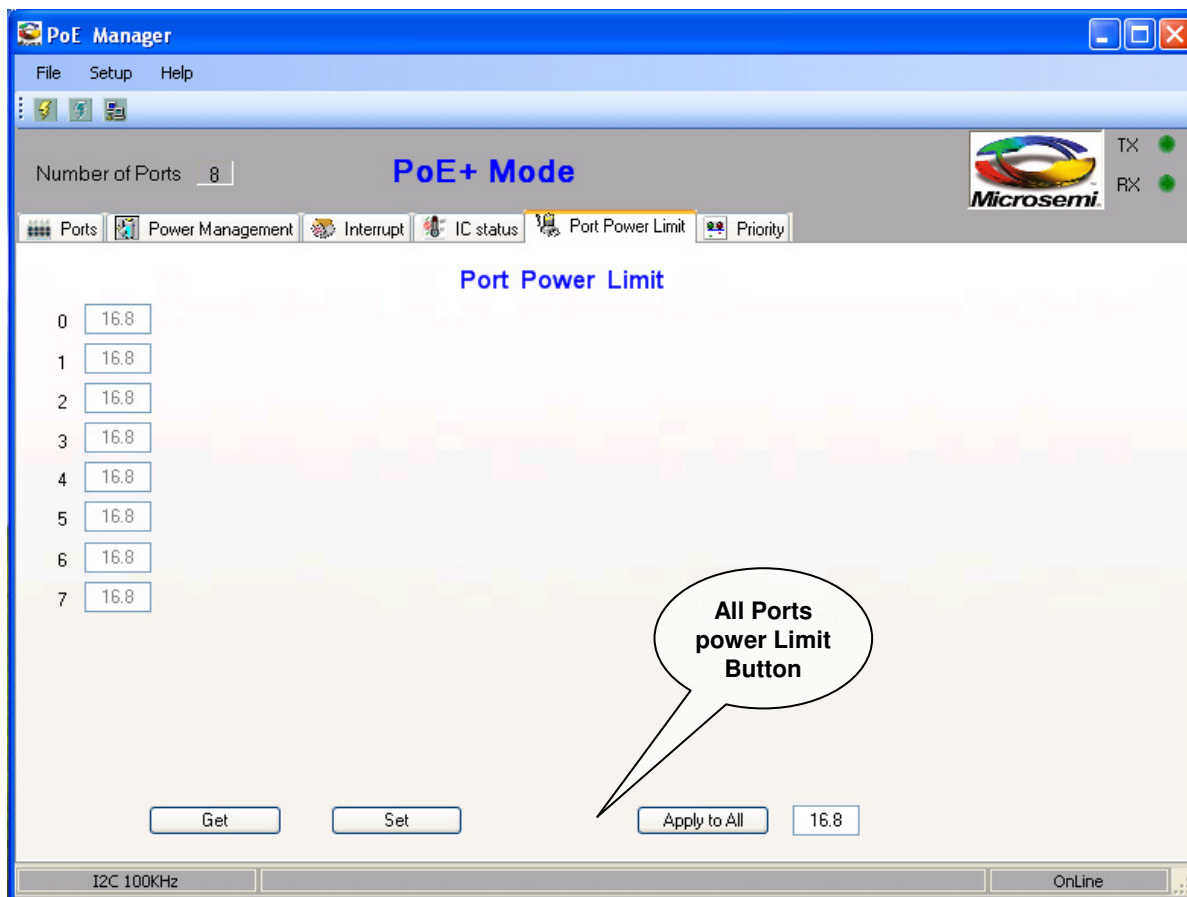
Figure 5-7: Port Power Limit Screen

Name	Function
Get	Restores current power limits as stored in the PoE Controller memory
Set	Sets all power limits to the PoE Controller as typed in the general power limit combo box
Apply to All 16.8	Sets all power limits to the PoE Controller as typed in the general power limit box.

5.8 Priority Tab

The Priority Screen shown in Figure 5-8, appears when the Priority Tab is selected. The Priority screen is used to set or get the ports priorities. The priority of each port may be set to each of the following options: Critical, High, Low.

It is possible to set each of the ports' priorities individually, or set all ports priorities to the same priority at once.

Figure 5-8: Priority Screen

Name	Function
Get	Gets the priority settings from the PoE Controller.
Set	Sets priority settings into the PoE Controller memory as typed in the Table
Apply to All Critical	Apply the selected global value to all ports combo Boxes

Chapter 6 – High Power 4-pairs Mode Operation

6.1 General

This chapter provides a detailed description of the High Power 4-pairs mode:

6.2 High Power 4-pairs Software Features

The High Power 4-pairs software supports the following features:

- Supports up to 48 ports (up to 8 PD-64012/G Devices), refresh interval is less than 3-second
- System measurements including: power consumption, voltage and current
- Port measurements including:
- Status (on, off, power management, overload) per port
- Power consumption [W] per port
- Current [mA] per port
- Class per port (0-4)
- Enable / disable per port
- Automatic detection of connected devices (number of ports)
- Displays GUI version and PoE Controller's software version
- Line Detection Algorithms:
- IEEE 802.3af
- Pre IEEE 802.3af Standard
- High Power 4-pairs (using Pre Standard IEEE 802.3at detection algorithm)
- Power management: Set system power budget, set power banks
- System Reset.
- Restore Default Parameters
- Save system Parameters
- Vmain limits setting
- Interrupt status, Interrupt masking
- Device temperature, temperature alarm setting
- Ports priority setting
- Logical/Physical port matrix view

6.3 Initialization

1. Adjust the power supply for 48 volts and apply power to the connected Evaluation Board.

2. Run the application by clicking on the ![icon], the Parameters initialization screen, followed by the *Opening High Power 4-pairs mode* Main screen appear, with the status bar displaying '**"I²C" + Rate or "UART" + Com number'** and '**Online'** at the bottom of the screen:

Figure 6-1: Startup Screen

3   If communictaion port operation fails (or the user wishes to modify the Communication link parameters manually) – Communication Setting dialog window appears (see Figure 6-1, Figure 6-2) allowing setting of the connected COM port and the I^{2}C parameters;
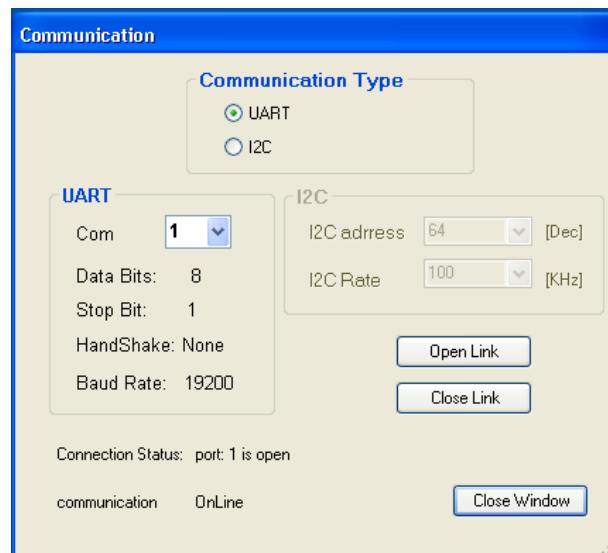
Figure 6-2: Communication Dialog Screen

6.4　　Main Screen

The High Power 4-pairs GUI provides an MMI (Man-Machine Interface) to the PD-IM-7548 Evaluation Board. The EVB consists of six to eight PoE devices – PD-64012s (12 physical ports). Each Logical Port　may operate as an IEEE 802.3af Standard Port, a Pre-Standard port, or a High-Power Port. The Maximum number of Ports available, is 48 Ports (up to 96 physical ports). A High-Power Device connected to a Logical Port employs two Physical Ports. The Main screen, shown in Figure 6-3 is divided into several sections as shown below:
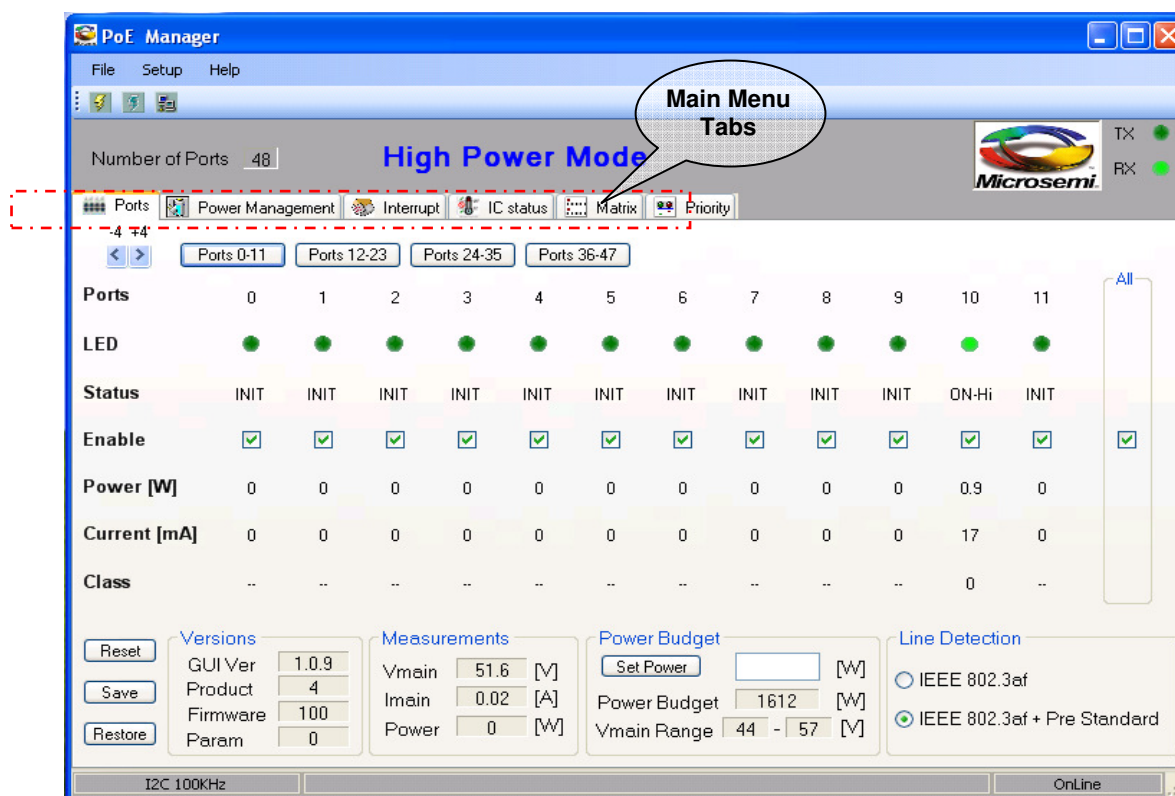

Figure 6-3: Main Menu - General View and Menu Fields
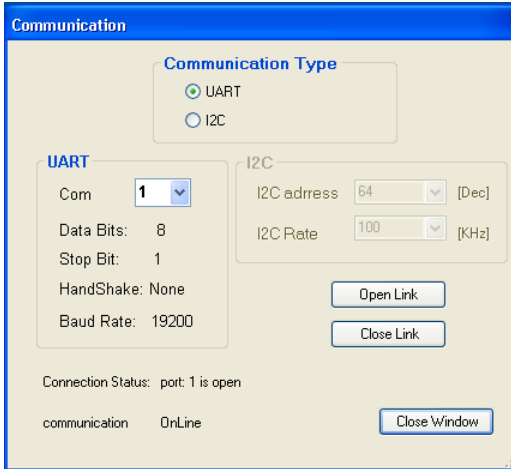
6.4.1　　Main Screen Buttons

The GUI's main screen includes the following buttons, indicators and combo boxes:

Button	Description
	Connects to the board
	Disconnects from the board
	Calls on the Communication Settings window
TX: RX:	Communication Indicators: blinking when the PC communicates well in both directions (Tx and Rx). Refresh rate depends on the number of components that should be updated. Refresh interval is between 1 to 3 seconds.

6.4.2   Main Screen Menu Option

Name	Function
	File
End	Exits the Program
	Setup
Communication	Opens a communication window: The user can select the desired PC Com-Port or I²C link for communication with the Evaluation Board and view its settings. The user may open or close a Link (connect or disconnect).
Admin	For Internal Use
Status Number	Displays the Status Number below the Status description in the "Ports" Screen.
	Help
About	General information window.
Demo	Demonstration of Enhanced Mode GUI features**.**
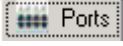
6.4.3 Main Menu Tabs

Name	Function
General information Area	
Number of Ports	Number of Logical Ports (up to 48 ports).
Tab Menus	
Ports	Displays real-time monitoring of the system and ports
Interrupt	Displays interrupt related information and masks
Power Mng	Sets power budget, power banks, valid input voltage and presents real time measurements
IC Status	Displays the current PD64012 devices temperature and enables temperature alarm limit setting
Matrix	Displays Logical to Physical port associations
Priority	Used for priority setting for all ports.
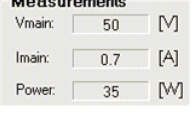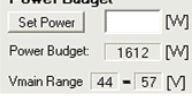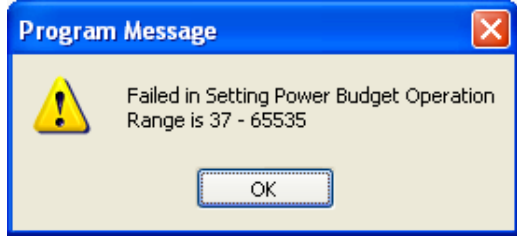
6.4.4 The Ports Tab

| Name	Function
Ports Area	
![Ports]	Display up to 12 Ports at a time. The desired Ports to be displayed may be selected by clicking the desired Port Selection tab (0-11, 12-23, 24-35, and 36-47). Another way to display ports is by clicking the "-4" or "+4" buttons, thus, advancing four ports (forwards or backwards).
Ports	Port Number – 0 up to 47. Note that a High-Power Port will have a "HiP" indication under it's index
Status	ON, ON-Hi (ON-High Power 4-pairs port), OFF, INIT (Initializing), OVL (Overload), UDL (under-load), P.M. (Power Management), ERR (Error), UnDef (Undefined), TEMP (Temperature), SHORT (Short-Circuit), VOUT (Supply Voltage not in range).
LED	The LEDs indicate changes in port status as follow: Dark Green : Port Off Light Green : Port On Yellow : Port Overloaded or Shorted Yellow blinking: Port under Power Management
Enable	When each checkbox is checked,, it enables the corresponding port. The ALL button enables/disables all ports at once.
Power [W]	Display of the currently measured port Power
Current [mA]	Display of the currently measured port Current
Class	Display of the currently detected Port Class, in accordance with the IEEE 802.3af standard.

6.4.5 Data Functions

Name	Data Functions
Reset	Resets the PoE Controller.
Save	Saves system settings
Restore	Restores Factory defaults
Versions GUI Ver: 5.1 Product: 4 Firmware 100 Param: 0	Displays the GUI Version and PoE Controller's Software Version
Measurements Vmain: 50 [V] Imain: 0.7 [A] Power: 35 [W]	Vmain – Main Input Voltage Imain – Main Input Current Power – Total Power consumption
Power Budget Set Power [W] Power Budget: 1612 [W] Vmain Range 44 – 57 [V]	**Set Power button -** Sets a Power limit, Allowable limits are 37W to 2000W. Otherwise, an error message appears: **Program Message** ⚠ Failed in Setting Power Budget Operation Range is 37 - 65535 OK Note: The GUI allows the user to set power limit from 37 to 65535. In Cases where power is out of range, the PoE CPU will reply with an error message.) **Power Budget** - Displays the power budget **Vmain Range** - Displays the Main input voltage ranges
Line Detection ○ IEEE 802.3af ● IEEE 802.3af + Pre Standard	The user may select the desired Line Detection Method: IEEE 802.3af IEEE 802.3af + Pre Standard

6.5 Power Management Tab

The Power Management screen, shown in Figure 6-4, appears when the Power Mng. Tab is selected.

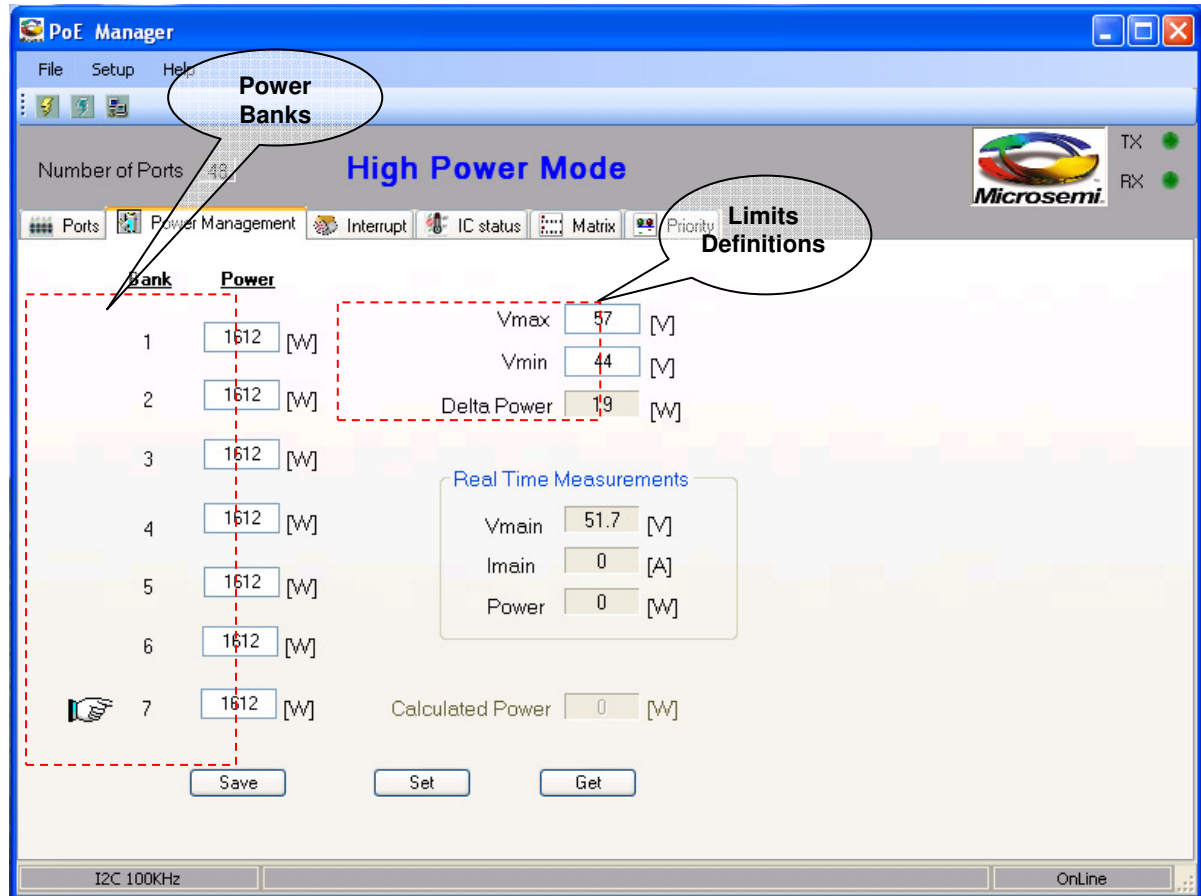**Figure 6-4: Power Management Screen**

Name	Function
Power Banks	Total output Power allowable: • Displays the selected power bank • Setting of allowable power per bank; each bank may be set to a different power value
Limits Definitions	**Vmax**: Upper limit for input voltage **Vmin**: Lower limit for input voltage **Delta Power** - 19W constant limit (range in which no additional ports can be connected)

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Name	Function
Real Time Measurements Vmain: 50 [V] Imain: 0.7 [A] Power: 35 [W]	Display of Real-Time current, voltage, and power: ▪ **Vmain** – Actual input line voltage ▪ **Imain** – Current consumption ▪ **Power –** Total power used (Vmain x Imain)
Calc Power 35 [W]	For Future Use
Set Power Param	Stores parameters into the PoE Controller
Get Power Param	Obtains all relevant data for the PoE Controller, related to the Power Management
Save	Stores all user-selectable parameters into PoE Controller memory

6.6 Interrupt Tab

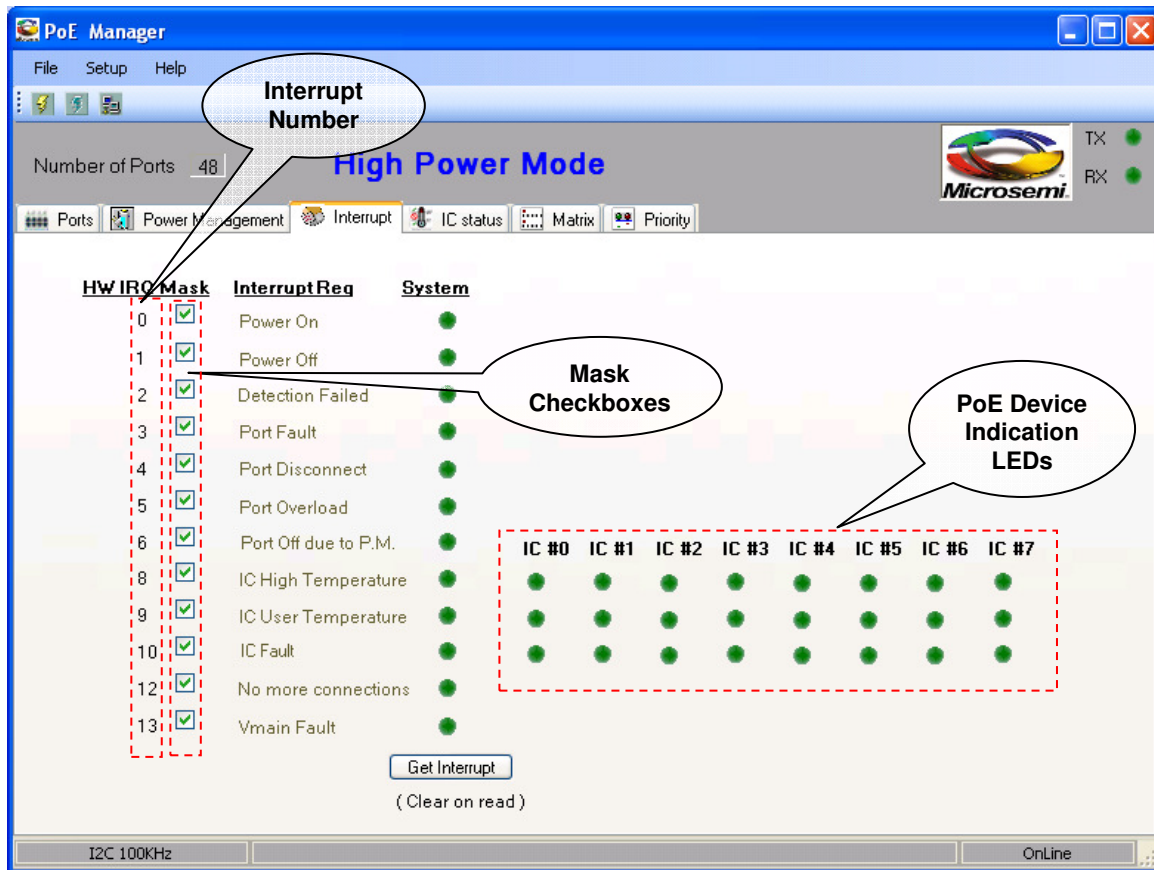The Interrupt screen shown in Figure 6-5, appears when the Interrupt Tab is selected.

Figure 6-5: Interrupt Screen

The Interrupt Screen includes the following:

Name	Function
Interrupt Number	Indicates event bit
Interrupt Mask Check boxes	Masks the relevant event's request of the PoE Controller
Interrupt Reg	Fixed description of each Interrupt event
System	Bright Green LEDs indicates that an interrupt event has occurred
Get Interrupt button	Refreshes the status of the Interrupt Events
ICs Indication of Interrupt LEDs	Indicates the specific PoE device that caused the event (bits 8 to 10)

6.7   IC Status Tab

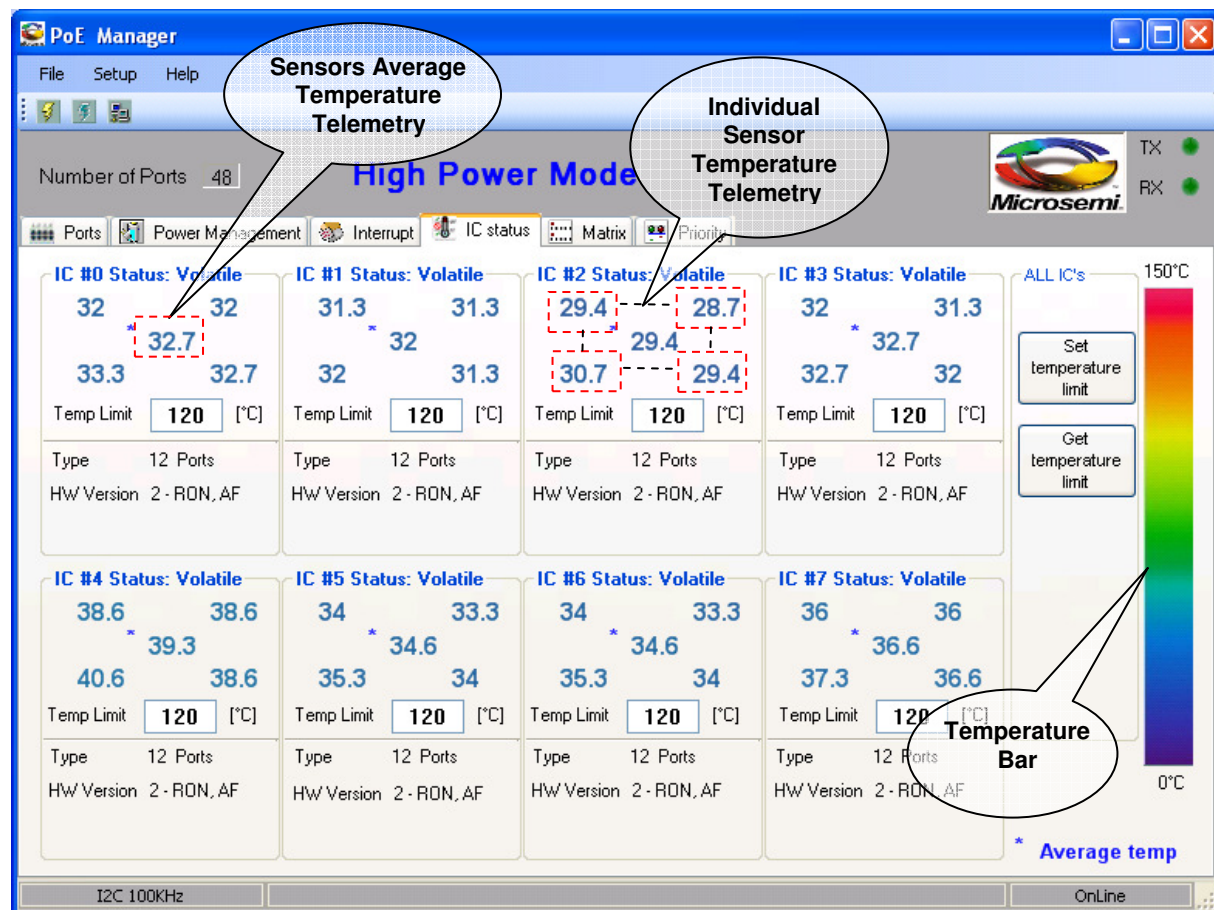The IC status screen, shown in Figure 6-6, appears when the IC status Tab is selected.

Figure 6-6: IC Status Screen

Name	Function
IC Number and Status	• Number: 0 to 7 ICs Status: OK, ERR, Diff, New (New IC has been connected), None (No IC)
Temperature Telemetry	• Four (or two) individual temperature sensors per IC • Average IC Temperature Temperature font Color – corresponds to the actual temperature
IC Info. and Setting	• Type – PoE device's number of ports (4 or 12 or other) • HW Version – PoE device's Hardware Version Temp. Limit – above this limit, an interrupt event occurs
Get Temperature Limit button	Gets the user temperature limits when clicked.
Set Temperature Limit button	Sets the user Temperature limits.
Temperature Bar	A color legend that represents the a temperature value color corresponding to the temperature font color

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6.8   Matrix Tab

The Matrix screen, shown in   Figure 6-7, appears when the Matrix Tab is selected. The Matrix screen is used to view the System's Ports configuration– Logical Ports, in accordance with the physical ports.
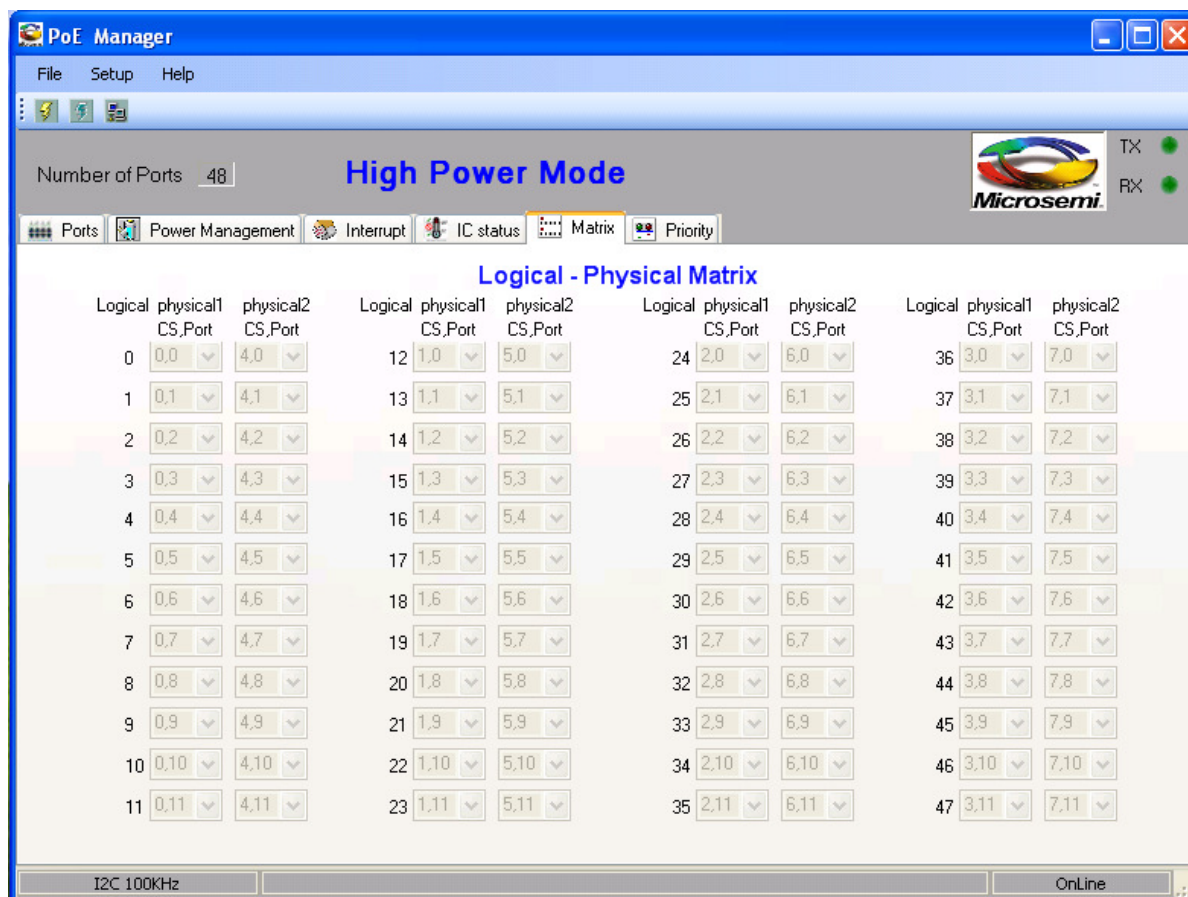

Figure 6-7: Matrix Screen

6.9 Priority Tab

The Priority Screen shown in Figure 6-8, appears when the Priority Tab is selected. The Priority screen is used to set or get the ports priorities.
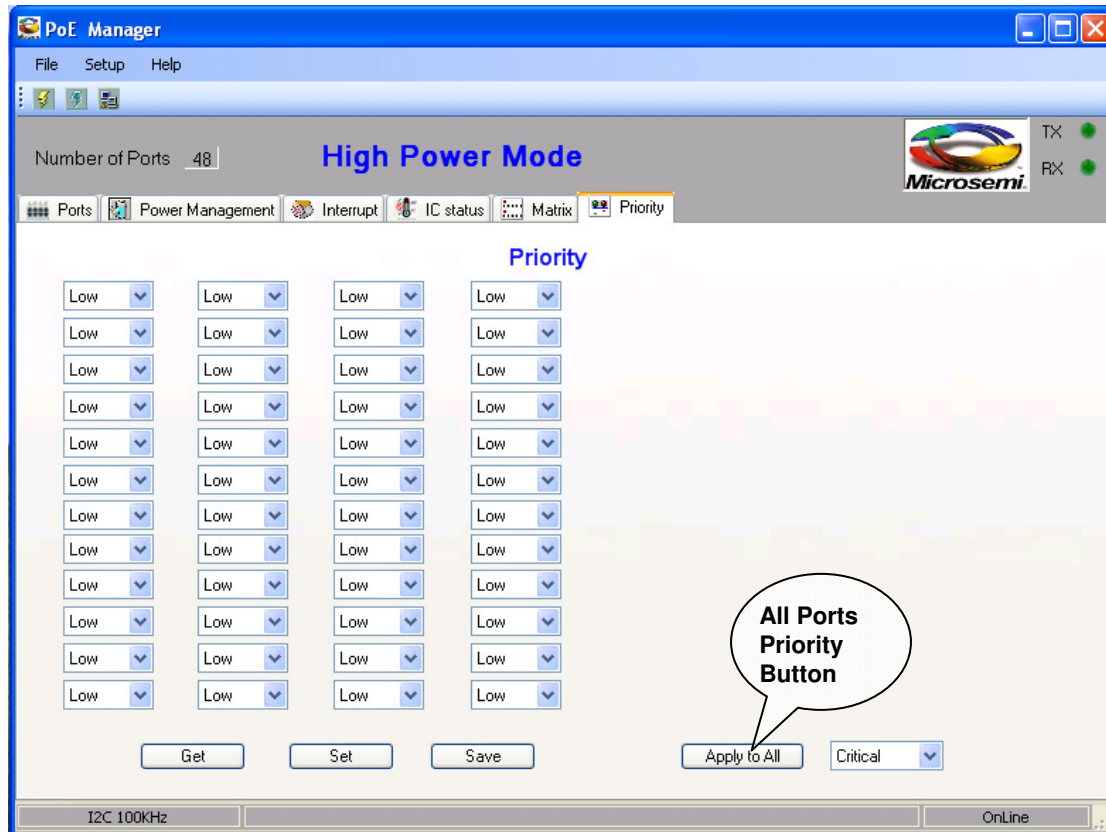

Figure 6-8: Priority Screen

The priority of each port may be set to each of the following options: Critical, High, Low. It is possible to set each of the ports' priorities individually, or set all ports priorities to the same priority at once.

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Name	Function
Set Priority	Allows user priorities settings
Get Priority	Gets priority settings from the PoE Controller
Set all priorities	Global setting is performed by using the drop-down list and clicking the "Set all priorities" button
Set Temperature Limit button	Sets the user Temperature limits.
Save	Saves the priorities into the PoE controller's memory

Chapter 7 - Troubleshooting

7.1 Troubleshooting

A troubleshooting guide is provided in Table 7-1.

The scenarios described in the table are simple and do not take into account human errors or multiple failures. Corrective action is to be carried out in a sequential manner.

For problems which are not resolved, refer to your nearest Microsemi Customer Support, as indicated on this User's Manual rear cover.

Table 7-1: PD-IM-7348 ,PD-IM-7324-L ,PD-IM-7348GH Evaluation Boards Troubleshooting Guide

Symptom	Corrective Action
Evaluation Board does not power up; D4 indicator (Vmain On) does not illuminate.	1. Verify that power is applied to the 48 VDC cable. 2. Verify that correct polarity is supplied to the Board. 3. Verify that the power cable at J1 is well secured.
UART communication with the Board fails to start	1. Ensure that there is a proper cable connection to J26 and to the other cable end. 2. Verify that a standard null modem RS-232 cable is used. 3. Verify that J14 is in position '3'. 4. Verify that jumpers J12 and J13 are set to position '1'. 5. Verify that the Board is set to Enhanced mode (switches SW2 thru SW5). 6. Depress Reset switch - SW1.
I^2C communication with the Board fails to start	1. Ensure that the Aardvark-Evaluation board I2C Adapting cable is properly connected. 2. Verify that the AArdvark driver is properly connected to the PC's USB cable. 3. Verify that the board is set to Auto mode. 4. Depress Reset switch - SW1.
A PD connected to the Board fails to operate	1. Verify that the PD is IEEE 802.3af-compliant and designed for PoE via the spare pair. 2. Replace the Ethernet cable. 3. Try to reconnect the PD to another port. If it is powered, then there is probably is a faulty port, or the RJ-45 connector in the gang assembly is defective.
PD powers up, but there is no data link	This is normal behavior since the Evaluation Board designed for demonstration purposes and does not support data.

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Revision History

Revision Level / Date	Para. Affected	Description
1.0/ 31.07.07		Initial release
1.1/ 20.12.07	Whole document	Adding the I²C feature
1.2/ 05.05.09	Enhanced Mode	Added text supporting Microsemi™ Enhanced mode controller - PD69000 containing AT mode capabilities.

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