

Simplifying System Integration

78M6612 AC-PMON Evaluation Board User Manual

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1 Introduction

The Teridian Semiconductor Corporation (TSC) 78M6612 AC-PMON Evaluation Board is an electrical measurement unit for performing measurements from a single electrical outlet. It incorporates the TSC 78M6612 single-phase, dual-outlet, power and energy measurement IC. The AC-PMON Evaluation Board is connected to PC through a USB cable such as one provided in the demo kit package. The Evaluation Board demonstrates the capability of the 78M6612 energy meter controller chip for measurement accuracy and overall system use.

The board is pre-programmed with demo firmware (file name 6612_OMU_S2_URT_V1_13.hex) in the flash memory of the 78M6612 IC that allows evaluation of the capability of the IC.

Included with the AC-PMON is a Windows[®] based Graphical User Interface (GUI) for simplified access to the following measurement data and controls:

- Power, current, voltage and power factor indicator dials
- Adjustable display scales
- Minimum and peak parameter tracking
- Selectable strip chart display format
- Narrow-band versus Wide-band measurement
- Selectable sample size averaging
- Accumulated energy usage and expense tracking
- Line frequency
- Alarm indicators
- Programmable Alarm thresholds
- Data log to file

Alternatively, the user can directly query the device with the command set using HyperTerminal and the provided 6612_OMU_S2_URT_V1_13 Firmware Description Document.

1.1 Package Contents

The 78M6612 AC-PMON Evaluation Board Demo Kit includes:

- 78M6612 AC-PMON Evaluation Board
- USB Daughter Board
- USB Cable Assembly USB A-B 28/24 1.8M (Tyco/Amp 1487588-3)
- CD with OMU Software and Documentation

1.2 System Requirements

The 78M6612 AC-PMON Evaluation Board requires use of a PC with the following features:

- PC (1 GHz, 1 GB) with Microsoft[®] Windows XP or Win2000, equipped with USB port.
- Minimum 1024 x 768 video display resolution.



1.3 Safety and ESD Notes



EXERCISE CAUTION WHEN LIVE AC VOLTAGES ARE PRESENT!



Standard ESD precautions must be taken when handling electronic equipment. The AC-PMON contains ESD protected interfaces.

Do not connect test equipment, ICE emulators or external development boards directly to the OMU-RF hardware. Damage to the OMU1-S-RF and external equipment will occur due to the 78M6612's "high side" reference topology. The 78M6612's V3P3 (i.e. "high side") is connected directly to Neutral (Earth Ground) creating a ground reference disparity with any properly grounded external equipment.

1.4 Firmware Demo Code Introduction

The Firmware Demo Code provides the following features:

- Basic energy measurement data such as Watts, Volts, current, VAR, VA, phase angle, power factor, accumulated energy, frequency, date/time, and various alarm statuses.
- Control of alarm thresholds, calibration coefficients, temperature compensation, etc.

There are two means to facilitate performance evaluation between the user at the PC host and the firmware code in the board:

- The Graphical User Interface (GUI). This document describes the installation and use of the Windows based GUI.
- The Command Line Interface (CLI) via HyperTerminal or comparable terminal emulator on a different operating system. For information about the CLI, see the 6612_OMU_S2_URT_V1_13 Firmware Description Document.

The AC-PMON is shipped with Demo Code Revision 1.13 or later loaded in the 78M6612 chip and included on the CD. The code revision can be verified by entering the command **>i** via the command line interface. Firmware for the Demo Unit can be updated using either the Teridian TFP1 or an in-circuit emulator such as the Signum Systems[™] ADM-51 (http://www.signum.com/Signum.htm).

The board components and firmware settings are designed to operate with the following nominal AC electrical ranges:

Voltage Current Line Frequency

110-240 VAC 10 mA - 20A 46-64 Hz

1.5 Testing the AC-PMON Evaluation Board Prior to Shipping

Before every AC-PMON Evaluation Board is shipped, the following procedures have been performed at the factory:

- Full Calibration Precise energy source equipment is used to calibrate the current and voltage. The temperature is also calibrated at the same time.
- Accuracy Test This "bench" level test ensures the energy accuracy is within +/-0.5%.

2 Installation

2.1 USB Driver Installation

This evaluation kit includes an optically isolated USB adaptor board for serial communications with a PC. The FTDI USB controller IC FT232RL performs the USB functions. The FTDI Windows driver presents a virtual COM port for enabling serial communications. Control of the AC-PMON module can be managed using either a terminal emulation program or using the supplied Windows Dashboard GUI. The FTDI Windows driver for Windows 2000 and XP.

 Upon attaching the AC-PMON to the PC, the Found New Hardware Wizard automatically launches and installs the appropriate driver files. If your PC does not find the FTDI driver files on its local hard disk drive, locate and reference the FTDI USB Driver and Utilities subdirectory on the CD. The FT232RL controller is powered from the USB cable and is active even when no AC power is applied to the AC-PMON.



Notes: If an older FTDI driver has been previously installed, it is recommended to remove the older version before installing this newer FTDI driver. Execute the **ftdiClean.exe** utility from the FTDI USB Driver and Utilities subdirectory.

For FTDI driver support on other operating systems, please check FTDI's website at (http://www.ftdichip.com/FTDrivers.htm).

2.2 Confirm COM Port Mapping

1. Launch the Control Panel and click on the System icon.

📴 Control Panel								
File Edit View Favorites Tool	s Help							
🕼 Back - 🕗 - 🎓 🔎 Search 陀 Folders 🔛 -								
Address 🚱 Control Panel								
Control Panel	Ġ,	Ż	õ	-	2	P	1	
🚱 Switch to Category View	Accessibility Options	Add Hardware	Add or Remov	Administrative Tools	Automatic Updates	Date and Time	Display	
See Also 🛞	Ø		 A second s		S	1		
🍓 Windows Update	Polder Options	Ponts	Controllers	Driver	Options	Keyboaru	Mail	
Help and Support	Ċ			4	4		<u></u>	
	Mouse	Network Connections	Phone and Modem	Power Options	Printers and Faxes	Regional and Language	Scanners and Cameras	
	B	۲		O,	Ż	(@)	Y	
	Scheduled Tasks	Security Center	SoundMAX AudioESP	Sounds and Audio Devices	Speech	Symantec LiveUpdate	System	

2. The System Properties screen appears. Click on the Hardware tab. Click on Device Manager. Under Ports (COM & LPT), look for the USB Serial Port assignment.



3. Take note of the COM port assignment for the USB Serial Port.



2.3 Basic Connection Setup

Figure 1 shows the basic connections of the 78M6612 AC-PMON Evaluation Board with the external equipment. The AC-PMON is powered through the USB cable. This same USB cable provides the communications link between the host PC and the AC-PMON.

The AC-PMON has two IEC 60320 connectors, one male and one female. The male connector is for inlet and the female connector is for outlet. The male connector is connected to a power chord from a wall outlet. The female connector connects to the load to be measured



Figure 1: AC-PMON Connections





The USB board connects to the AC-PMON Evaluation Board as shown below.



The red and green wires of the USB board connect to J7.1 and J7.4 of the AC-PMON Evaluation Board, respectively, and are the wires that carry the 5VDC and GND to the AC-PMON Evaluation Board.

2.4 Verify Serial Connection to the PC

After connecting the USB cable from the AC-PMON to the host PC, start the HyperTerminal application (or another suitable communication program) and create a session using the communication parameters show in Table 1.

Table 1: COM	Port Setup	Parameters
--------------	------------	------------

Setup Parameter	78M6612
Port speed (baud)	38400
Data bits	8
Parity	None
Stop bits	1
Flow control	Xon/Xoff

HyperTerminal can be found in Windows by selecting Start \rightarrow All Programs \rightarrow Accessories \rightarrow Communications \rightarrow HyperTerminal. The connection parameters are configured by selecting File \rightarrow Properties. The New Connection Properties menu appears.

New Connection Properties	? 🗙	
Connect To Settings		
New Connection Change Icon		
Country/region: United States (1)		
Enter the area code without the long-distance prefix.		
Area code: 714 Phone number:		Select
Connect using: COM1		CONTOR
Use country/region code and area code		
ОК Са	ancel	

Select the appropriate COM port and click **Configure**. The **COMn Properties** menu appears.

COM3 Properties	? 🗙
Port Settings	
	_
Bits per second: 38400	
Data bits: 8	
Parity: None	
Stop bits: 1	
Flow control: Xon / Xoff	
Restore Default:	5
OK Cancel Ap	ply

Note that port parameters can only be adjusted when the connection is not active. It may be necessary to click the Disconnect Button to disconnect the port.

Disconnect	
🏶 Demo Board Connection - HyperTermina	al 📃 🗆 🔀
Eile Edit Yiew <u>C</u> all Iransfer <u>H</u> elp D 🖙 📨 🕉 💷 🏠 😭	
!:04 1030 02 000000 !:04 1034 02 000000 !:04 1034 02 000000 !:01 0000 04 0069C !:01 0004 04 00 !:04 0005 04 3602D93 !:04 0009 04 2074634 !:02 0015 04 1770 !:02 0017 04 0820 !:02 0019 04 0000 !:02 001D 04 00 !:04 0025 04 054DEC !:04 002B 04 3DCC786 !:04 0031 04 0007D5	00 BA 00 B6 2F 27 3E A4 CB 2D E B 1 CB D7 600 4C 3 8D 5E
Connected 0:22:30 ANSIW 9600 7-N-	N-2 SCROLL CAPS NUM Capture Print echo

2.5 NI RunTime Installation

The GUI Dashboard program is created using National Instruments LabVIEW[®]. The NI RunTime Engine must be installed first before launching the Dashboard GUI.

1. Open the LabWindows XP Installer directory on the CD.



2. Execute the **setup.exe** file.



3. Select the destination directory.

🛿 Setup	
Destination Directory Select the primary installation directory.	
All software will be installed in the following location(s). To install software into a different location(s), click the Browse button and select another directory.	
C:\Program Files\omu gui\ Brows	e
Directory for National Instruments products C:\Program Files\National Instruments\ Brows	e
<pre></pre>	Cancel

4. Accept the License Agreement.

📲 Setup
License Agreement You must accept the license(s) displayed below to proceed.
NATIONAL INSTRUMENTS SOFTWARE LICENSE AGREEMENT
INSTALLATION NOTICE: THIS IS A CONTRACT. BEFORE YOU DOWNLOAD THE SOFTWARE AND/OR COMPLETE THE INSTALLATION PROCESS, CAREFULLY READ THIS AGREEMENT. BY DOWNLOADING THE SOFTWARE AND/OR CLICKING THE APPLICABLE BUTTON TO COMPLETE THE INSTALLATION PROCESS, YOU CONSENT TO THE TERMS OF THIS AGREEMENT AND YOU AGREE TO BE BOUND BY THIS AGREEMENT. IF YOU DO NOT WISH TO BECOME A PARTY TO THIS AGREEMENT AND BE BOUND BY ALL OF ITS TERMS AND CONDITIONS, CLICK THE APPROPRIATE BUTTON TO CANCEL THE INSTALLATION PROCESS, DO NOT INSTALL OR USE THE SOFTWARE, AND RETURN THE SOFTWARE WITHIN THIRTY (30) DAYS OF RECEIPT OF THE SOFTWARE, AND RETURN THE SOFTWARE WITHIN THIRTY (30) DAYS OF RECEIPT OF THE SOFTWARE, INCLUDING ALL ACCOMPANYING WRITTEN MATERIALS, ALONG WITH THEIR CONTAINERS) TO THE PLACE YOU OBTAINED THEM. ALL RETURNS SHALL BE SUBJECT TO NI'S THEN CURRENT RETURN POLICY.
O I accept the License Agreement(s).
I. <u>Definitions</u> . As used in this Agreement, the following terms have the following meanings: I accept the License Agreement(s). I do not accept the License Agreement(s). Kert Structure Agreement(s). Cancel

5. Start the installation.

🕄 Setup	
Start Installation Review the following summary before continuing.	
Adding or Changing • omu gui Files	
Click the Next button to begin installation. Click the Back button to change the installation settings.	
Save File Ca	ncel

6. When the installation is complete, restart your computer.



2.6 Install LabWindows[™] XP Pro Update

Do not install LabWindows XP Pro Update on Win2k.

1. Launch the LabWindows XP Pro VISA Update.exe installation file on the CD.



2. Un-zip the file to the proper folder.



3. Start the installation.



4. Select the proper destination directories.

🥨 NI-VISA 4.4.1 Runtime		🐺 NI-VISA 4.4.1 Runtime	
Destination Directory Select the primary installation directory.		Features Select the features to install.	
National Instruments software will be installed in a subfolder of the following. To in different folder, click the Browse button and select another. Destination Directory C: VProgram Files Waional Instruments \	nstali into a	Directory for NI-VISA 4.4.1	National Instruments VISA driver version 4.4.1. VISA provides an API for controlling VA, GPIB, Serial, PA and other types of instruments.
Back Ne</th <th>xt >> Cancel</th> <th>Restore Defaults Disk Co</th> <th>st << Back Next >> Cancel</th>	xt >> Cancel	Restore Defaults Disk Co	st << Back Next >> Cancel

5. Accept the License Agreements.



6. The following screen appears. Click Next.

INI-VISA 4.4.1 Runtime	
Start Installation Review the following summary before continuing.	
Upgrading • National Instruments system components Adding or Changing • NI/VISA 4.4.1 Run Time Support PXI GPIB Serial GPI8-XXI Ethernet Remote Enet-Serial USB Firet/Vire TULIP COM Support	
Click the Next button to begin installation. Click the Back button to change the installation	settings.
Save File) << Back Next	>> Cancel

7. Click Finish.

1 NI-VISA 4.4.1 Runtime	
Installation Complete	
Installation completel You might be prompted to reboot your machine.	
N	lext >>) Finish

- 8. Copy the OMU GUI V2p1.exe application file from the CD to your PC.
- 9. Restart your computer.

3 Operating the Dashboard GUI

Start the Dashboard Program using launching Teridian OMU GUI V2p1.exe.

3.1 Port Selection

The COM port must be selected before data can be received from the AC-PMON. Select the COM port assignment previously defined on the Device Manager screen in Section 2.2.



The Run and Stop buttons are located above the Teridian logo.



If the AC-PMON is disconnected from the USB cable, close and restart the GUI to re-establish the USB COM port connection.

3.2 Creating a Measurement Data Log File

Upon clicking the **Run** button, a File Write dialog box appears. The GUI stores retrieved measurement data to a file for post processing. Enter the desired subdirectory and file name. Click **OK** to launch the main GUI display.

Select Data Log	File to write.						? 🔀
Save in:	🚞 OMU Datalog)	~	6	1 🖻	•	
My Recent Documents							
Desktop							
My Documents							
My Computer							
	File name:	Data LogFile SN1			¥		OK
My Network	Save as type:	All Files (*.*)			~] (Cancel

The measurement data is stored as text characters delimited by commas. Click the **Stop** button to close the text file and end the data logging function. New data log files are created wherever the **Run** button is clicked. The data log capture automatically stops after 12 hours. 12 hours of data results in a 12 MB file. To import the data log file into Excel, see Section 3.19.

3.3 Selecting the Power Display Parameter

Using the Watts Selection menu under OMU Control Modes, select Watt, VA or VAR as the power display parameter.

		AN H COHIF	78M	6612 (Dutle	t Mea	suremen	t Unit Der	no _{92,1}		
Watts 200 150 150 0.000 0.000 0.000 0.000 0.000 20 - 25 - 20 - 20 -	300 350 400- 455 500 Watt Watt Min Watt Max	Current (n 2 2 1.5 0.0000 0.0000 0.0000	net) 5 2 3.5 4 4.5 Irms-wb Man Max	Vakage (rr 50 25 0.000 0.000	We) 5 100 125 150 Venus Man Venus Max	Power 0.8 0.7 0.00 0.000 0.000	Factor 10 +0.8 +0.7 5 0.5 (+) 1Lags V PowerFactor -wb Max	Select COM Po P OMLU Contro Watts Selection Watts Renge Soow w Watts Renge Soow w Sample Renge Band Band Band Band Band Band Reset Min/Mox	t Scores Notage Range 10 Modes Volage Range 10 Vic M Drever Range Score Coulor Coulor Coulor Coulor Coulor Coulor Coulor Coulor Coulor Coulor Coulor Coulor Coulor Coulor		
15- 10- 5- 0-1	50 10	0 150 2	90 250	300 350	400	450 50	0 550 600	Neutra A Frec	Viotage Anno Anno Anno Anno Anno Anno Anno Ann		Watt, VA, o VAR menu

Real power is the time average of the instantaneous product of voltage and current (**Watt**). Apparent power is the product of rms (root mean square) volts and rms amps (**VA**, volt-amps). Reactive power is the time average of the instantaneous product of the voltage and current, with current phase shifted 90 degrees (**VAR**, voltamps reactive).

3.4 Selecting the Display Scales

The range of values displayed in the **Watts** dial, the **Current (rms)** dial, and the **Voltage (rms)** dial can be changed. Use the **Voltage Range**, **Watts Range** and **Current Range** menus under **OMU Control Modes** to select the display scales for Watts, Current, and Voltage.



3.5 Resetting the Min and Max Indicators to Their Current Values

The **Reset Min/Max** button sets the Minimum and Maximum display values to the current conditions. Press the **Reset Min/Max** button to store the measured values in the first row of the display into the second row (the Min values) and the third row (the Max values).



3.6 Begin Tracking Minimum and Maximum Conditions

To begin tracking minimum and maximum conditions as they occur, click the **Start Min/Max** button. Minimum values will display in the second row and maximum values will display in the third row.



3.7 Selecting Outlet1

The GUI has provisions to display two loads: **Outlet1** and **Outlet2**. However, the AC-PMON contains only one load socket. Select **Outlet1** for use with the AC-PMON. All **Outlet2** power and current measurement displays show "0.00" due to the missing load circuit. Similarly, all Totals measurement displays mirror the Outlet1 results. The GUI also provides configuration for two load relays. The AC-PMON does not contain relays.



3.8 Selecting Wide Band or Narrow Band Measurement

The GUI provides for two measurement algorithm options. The **Wide Band** measurement method is optimal for measuring power from equipment with switching power supplies. The **Narrow Band** method works well with conventional loads. All measurement displays, dials and graph are updated with the appropriate data based on the **Wide Band / Narrow Band** selection.



3.9 Selecting the Sample Interval

Sample Interval provides a menu of sample sizes for display averaging. The 1 Second setting updates the display with every sample once a second. The 5 Seconds setting averages 5 samples and updates the display every 5 seconds, etc. **Interval Cnt** provides an index for the next display update. For example, if **Sample Interval** is set to 5 Seconds, **Interval Cnt** will count from 1 to 5.



3.10 Alarm Status

The **Alarm Status** indicator turns red if any Alarm Status Threshold is exceeded. See Section 3.16 for more information.

3.11 Neutral Voltage Alarm

The Neutral Voltage Alarm turns red when the Line and Neutral wires are reversed and Earth GND is connected. Earth GND must be connected for this function to operate properly.



3.12 Line Frequency

The **Line Frequency** indicator displays the existing line frequency. Frequency is displayed with 0.1 Hz resolution. "???" is displayed when no voltage is present.



3.13 Accumulated Energy Usage and Expense Tracking

If a **Cost per KWh** value is entered, the AC-PMON will calculate and display the accumulated energy cost.

- Slide the vertical scroll bar down to display the **Present Cost/KWh**, which shows the currently stored value in the AC-PMON.
- Enter a new value, such as 10, in the box below and click the **Write KWh Cost** button to save this updated cost information. Do not hit the keyboard's Enter key after typing in the new numeric value.
- The **Total Energy** and **Total Cost** windows (under **Duplex Totals**) update automatically with the new information.
- The accumulated **Total Energy** and **Total Cost** windows are reset by clicking the **Reset Min/Max** button.



3.14 Displaying Narrowband and Wideband Values Simultaneously

Slide the horizontal scroll bar to the right to view both sets of data.

000	100 M				
)utlet Measuremen	t Unit Demo				
ra) 5 100 105 100 105 100 105 100 105 100 105 100 105 100 105 100 105 100 105 100 105 100 105 105	Select CON Fort SCORE W Http: COLL CONTROL Modes Water Selector: Vidage Range Water Selector: Vidage Range Vidage Range Water Selector: Vidage Range Vidage Range	NarrowBand Measure 0.1244 Iminité 117.230 Vres 13.690 Vres 14.574 Vrésh 44.10 Vrésh -0.953 PreseFactor nb 34.699 PresaRaje nb WideBand Measurem 0.2136 0.2136 Iministée 117.230 Vres	Strend S VA-ob / Vims capt (cans (^m2) / samples) sam (**1) sam (**1) sam (V*1) wate (VA-ob ATAN (VAR-ob / Web) ents sam (sam (1*2) / samples) sam (sam (1*2) / samples)		
400 450 500 550 600	Alem Soluta Media di Walapa Alem Une Frequency 50.0	13.890 VA-wb 25.059 VA-wb -20.356 VAA-wb 0.554 PowerFactor-wb 302.479 PhaseAngle-wb	Vms * Ims-wb sqt (VA-wb^2 - Watt^2) Watt / VA-wb ATAW (VAR-wb / Watt) *** = number squared		Horizontal Scroll Bar
öelect Time Scale Ten Minutes	Нер	Narrowband Duplex Totals Total NB Watts	Wideband Duplex Totals Total WB Watts	×	

3.15 Using the Parameter Graph

Use the Parameter Graph to display sample size averages for a specified parameter and time scale.

- Select the parameter to chart using the **Select Parameter** menu.
- Select the time scale using the Select Time Scale menu.



3.16 Setting Alarm Status Thresholds

The AC-PMON can trip an alarm whenever a specified minimum or maximum temperature, frequency, voltage, maximum current narrowband, maximum current wideband, power FTC narrowband and power FTC wideband. When the specified value is exceeded, the corresponding **Alarm Status Indicator** turns red. Also, the **Alarm Status** on the Dashboard turns red.

• To the left of the main control panel are the **Alarm Status Indicators**. Use the horizontal scroll bar to bring the indicators into view.



• Below the **Alarm Status Indicators** are the current AC-PMON values and data entry boxes to change the AC-PMON event counter threshold values.

u gui.vi	Mindow Make					×		
for Obersee Toos	Wuone Geb				0.4	8		
080					-			
Event C Ti	ounter & Ala hreshold Val	arm Status lues	Energy Usage and Expense		C			
Present Minimum E Temperature T 0.0 Present Maximum E Temperature T	nter Minimum emperature 0.0 nter Maximum emperature	Write Minimum Temperature	Present Cost(XXWh 0.0000 Enter	Total Energy 0.000 Total Cost	Total Watts 0.000 Total Watts Max			
0.0 Present Minimum E Frequency F 0.0	servature temperature Write 0 70.0 Tem servat Meanum Enter Minimum ouency Frequency Write 0 59.0 Fre	Vrite Minimum Frequency	Cost per KWh 0.1500	0.000	0.000 Total Watts Min			
Present Maximum E Frequency F 0.0 Present SAG E	nter Maximum requency 51.0 Inter SAG	Write Maximum Frequency	KHILOR		Jordon			
0.000	Voltage 90.000 Enter Minimum Voltage 100.000	Write SAG Voltage				10		
Voltage V		Write Minimum Voltage	Relay	Configuration	n			
Voltage V 0.000	okage 140.000	Write Maximum Voltage	Present Relay Enter Configuration Conf	guration	Write Relay			
Max Current NB M	lax Current NB	Write Outlet1 Max Current NB	Present Ente Sequence Delay Sequ	Present Enter Sequence Delay Write 0.0 0.1 Sequence Delay				
Max Current WB M 0.000 Present Outlet1 E	Max Current W8 15.000 Enter Outlet1	Write Outlet1 Max Current WB	Present Entre Energize Delay finer 0.000 0.01	gize Delay	Write Energize Delay			
0.000 Present Outlet 1 E	0.700 nter Outlet1	Write Outlet1 Min Pwrfct NB	Present En De-energize Delay De 0.000 0	Article 1 De-energize Delay De	nergize Delay	Write e-energize Delay		
0.000	ax PWFCt ND 0.700	Write Outlet1 Max Pwrftr WB			>	2		
							Enter	
						_		
							Value(s)	

- Enter a new value and click on the respective **Write** button to save the new value to the AC-PMON.
- Do not press the keyboard's **Enter** key after typing in a new numeric value.

3.17 Relay Configuration Controls

The AC-PMON does not contain relays. Do not use the Relay Configuration controls with the AC-PMON.

Relay Config Present Relay Enter Relay	uration	Relay DIO Control		Relay Configuration
Comparation Comparation 0 D0000000 Present Enter 0.0 0.1 Present Enter Energize Delay Encergize Delay 0.000 0.010 Present Enter De-energize Delay De-energize Delay 0.000 0.010	Write Relay Configuration Write Sequence Delay Write Lenergize Delay Write De-energize Delay	DIO Control Status 0 Enter Relay DIO Control 00000000 Write Relay	1	

3.18 Log File Import to Excel[®]

The AC-PMON measurement data can be graphed and post processed by importing its text data into various analysis programs. The column data is separated by commas. The first dozen lines contain AC-PMON informational data. The measurement data follows with each 1-second sample stored as a separate line item.

To import the log data into Excel, begin by clicking on the Excel File/Open option from the main menu.

Open						?	×
Look in:	Cm OMU DataLog	~	٩	- 刘	×	📸 💷	-
My Recent Documents Documents My Documents My Computer My Network Places	Data LogFile SN1.txt Data LogFile SN2.txt Data LogFile SN3.txt Otal LogFile SN4.t.txt OMU GUI v2p1.exe OMU GUI v2p1.ini						
	File name:			¥			
	Files of type: All Files (*.*)			~			
Tools 🔹			Ope	n v		Cancel	

Change the Files of type to all Files(*.*). Then find your sub-directory and select your data log file.

Text Import Wizard - Step 1 of 3	?×
The Text Wizard has determined that your data is Delimited.	
 Original data type 	
Choose the file type that best describes your data:	
<u>Delimited</u> - Characters such as commas or tabs separate each field. Eixed width - Fields are aligned in columns with spaces between each field.	
Start import at row: 1 File origin: 437 : OEM United States	*
Preview of file C:\OMU DataLog\Data LogFile SN41.txt.	
1 [:\PDU\gui\Data LogFile SN41.txt 2 8/27/2009, 3:25 PM 3 I 4 5 FSC 78M6612 OMU S2 URT v1.13,Jul 16 2009(c)2009 Teridian Semiconductor	C4 🗸
	>
Cancel < Back Next > Fi	nish

No changes required on the next dialog box, click Next.

Text Import Wizard - Step 2 of 3
This screen lets you set the delimiters your data contains. You can see how your text is affected in the preview below.
/ Delimiters
Tab
Text gualifier:
Other:
Data preview
8/27/2009 3:25 PM
μ μ μ
TSC 78M6612 OMU S2 URT v1.13 Jul 16 2009(c)2009 Teridian Semiconductor 👽
Cancel < <u>B</u> ack <u>N</u> ext > <u>F</u> inish

Uncheck **Tab** and then check **Comma**. Click **Next** to proceed.

Text Import Wizard - Step 3	l of 3 🛛 🖓 🔀				
Advanced					
Data preview					
C:\PDU\gui\Data LogFile SN41.txt 8/27/2009 I TSC 78M6612 OMU S2 URT v1.13 Jul 16 2009(c)2009 Teridian Semiconductor v					
	Cancel < Back Next > Einish				

Select **Text** for Column data format. Click **Finish** to complete importing log file data.

The log file text data can now be parsed using standard Excel formulas.

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	10:42:64	0				0	0		0	0	0	0	0		0					
	10:42:05 A	\$ 55.9	113.285	69.577	0.614	-0.378	69.578		1	0	0.69	-35,701	78.202	-0.85	333.467					
	10:42:07 4	55.9	113.329	69.607	0.614	-0.409	69.609		1	0	0.69	-33.7	78.228	-0.85	333.467					
	10:42:09 4	4 50	113.351	69.668	0.615	-0.376	69.669		1	0	0.691	-35.7	78.282	-0.85	333.467					
	10:42:10 4	\$ 59.9	113.365	69.605	0.615	-0.385	69.69		1	0	0.691	-35.718	78.309	-0.85	333.467					
	10:42:12 4	4 50	113.367	69.601	0.615	-0.392	69.69		1	0	0.691	-35.722	78.311	-0.85	333.467					
	10:42:13 4	A 50	113.37	69.697	0.615	+0.406	69.698		1	C	0.691	+35,721	78.338	+0.85	333.467					
	10:42:15 A	4 50	113,36	69.65	0.615	+0.387	69.691		1	0	0.691	-35.725	78.313	-0.85	333.467					
	10:42:16 4	\$ 55.9	113.291	69.616	0.614	-0.393	69.617		1	0	0.691	-33.721	78.245	-0.85	333.467					
	10:42:18 4	6 60	113.301	69.705	0.615	-0.41	69.706		1	0	0.691	-35.744	79.325	-0.95	332.663					
	10:42:19 4	55.9	113.379	69.693	0.615	-0.402	69.694		1	0	0.691	-35.731	78.315	-0.85	333.467					
	10:42:21 4	4 50	113.409	69.731	0.615	-0.408	69.739		1	0	0.691	-35.756	78.17	-0.85	332.663					
	10:42:23 4	4 50	113.381	69.715	0.615	-0.363	69.716		1	0	0.691	-35.744	78.344	-0.85	332.663					
	10:42:24 4	4 50	113.351	69.681	0.613	+0.409	69.682		1	0	0.691	+35.727	78.306	-0.85	333.467					
	10:42:26 4	\$ 55.9	113.381	69.7	0.613	+0.348	69.701		1	0	0.691	-33,753	78.335	+0.85	332.663					
	20:42:27 #	50	113.334	69,665	0.613	-0.42	69.666		1	0	0.691	-33.709	78.254	+0.85	333.467					
	10142-29 4	a 50	113-23	69.608	0.014	-0.354	09.003		1	U.	0.091	-33.123	78-239	-0.81	333.467					
	10-12-10-1	- 60	113.281	69.004	0.614	-0.395	69.603		4	0	0.691	-33.742	78.245	-0.85	332.063					
	10-12-12	50	113 363	60.615	0.615	-0.425	69.397		+	0	0.693	-93,763	78-238	-0.65	312,003					
	10-42-15 4	50	113.265	69.603	0.614	-0.845	69.603		1	0	0.691	-35,739	78.317	-0.85	233.467					
	10-42-17.4	40	113.288	69.618	0.615	-0.331	69.619		1	0	0.691	-25,755	78.365	-0.85	313.467					
	10-42-18 4	40	113,281	69.603	0.614	-0.438	69.603		1	0	0.691	-35.749	78.346	-0.85	332.663					
	10:42:40 4	50	113 293	69,602	0.614	-0.419	69.601		1	0	0.691	-35.764	78.258	-0.885	312.661					
	10:42:41 4	50	113,236	69,583	0.614	-0.362	69.582		1	0	0.691	-35.729	78.219	-0.85	333.467					
	10:42:43 4	60	113,241	69.571	0.614	-0.373	69.574		1	0	0.691	-35,749	78.22	-0.881	312.663					
5	10.42.44	4 50	115.250	69.573	0.614	-0.415	69.374		1	0	0.091	-35.772	78.231	-0.885	332.003					
7	10:42:46 4	a 50	113.239	69.555	0.614	+0.422	69.556		1	0	0.691	+35.758	78.208	+0.885	332.663					
1	+ + Da	ta LogFie	5141	7									4							8

4 Schematics, Bill of Materials and PCB Layouts

This section includes the schematics, bill of materials and PCB layouts for the 78M6612 AC-PMON Evaluation Board and of materials for the USB Daughter Board.

4.1 78M6612 AC-PMON Evaluation Board Schematics



Figure 3: 78M6612 AC-PMON Evaluation Board Electrical Schematic (1 of 2)

78M6612 AC-PMON Evaluation Board User Manual



Figure 4: 78M6612 AC-PMON Evaluation Board Electrical Schematic (2 of 2)

4.2 78M6612 AC-PMON Evaluation Board Bill of Materials

Table 2: 78M6612 Evaluation Board Bill of Materia	ils

Item	Q	Reference	Part	PCB Footprint	Digi-Key/Mouser Part Number	Part Number	R
1	4	C1,C5,C8,C13	1000pF	RC0603	445-1298-1-ND	C1608X7R2A102K	
		C2,C10,C12, C14,C15,C20,					
2	8	C21,C22	0.1uF	RC0603	445-1314-1-ND	C1608X7R1H104K	
3	3	C3	10uF, 25V	RC1812	478-1762-1-ND	TPSC106K025R0500	
4	1	C4	100pF	RC0603	445-1281-1-ND	C1608C0G1H101J	
5	2	C7,C9	27pF	RC0603	445-1274-1-ND	C1608C0G1H270J	
6	2	C11,C16	4.7uF	RC1206	445-1606-1-ND	C3216X7R1E475K	
7	1	J5	HEADER 4	4X1PIN	S1011E-36-ND	PBC36SAAN	
8	1	J6	HEADER 6	6X1PIN	S1011E-36-ND	PBC36SAAN	
9	1	J7	HEADER 6	6X1PIN	S1011E-36-ND	PBC36SAAN	
10	1	R1	0.004, 1%, 2.5W	2512	66-ULR25R004FLFTR	ULR25R004FLFTR	
11	3	R3,R8,R16	750, 0.1%	RC0603	RG16P750BCT-ND	RG1608P-751-B-T5	
12	1	R4	16.9K, 1%	RC0603	P16.9KHCT-ND	ERJ-3EKF1692V	
13	2	R5	20.0K, 1%	RC0603	P20.0KHCT-ND	ERJ-3EKF2002V	
14	4	R6,R7,R20,R21	1M, 0.1%	RC1206	660-RN732BTTD1004B25	RN732BTTD1004B25	
15	3	R9,R19,R22	68	RC0603	P68GCT-ND	ERJ-3GEYJ680V	
16	1	R10	0	RC1206	P0.0ECT-ND	ERJ-8GEY0R00V	
17	3	R11,R14,R15	330	RC0603	P330GCT-ND	ERJ-3GEYJ331V	
18	2	R12,R13	10K	RC0603	P10KGCT-ND	ERJ-3GEYJ103V	
19	2	R16,R17	2K	RC0603	P2.0KGTR-ND	ERJ-3GEYJ202V	
20	1	TP1	HEADER 2	2X1PIN	S1011E-36-ND	PBC36SAAN	
21	1	U1	78M6612-IM	68QFN	_	78M6612-IM	
22	5	U2,U3,U4,U5,U6	OPTOCOUPLER	5-MFSOP	TLP112AFCT-ND	TLP112A(TPR,F)	
23	1	VR1	VBT1-5V	VBT1	102-1397-1-ND	VBT1-S5-S5-SMT	
24	1	VR2	3.3V, 500mA	SOT223	511-LD1117S33C	LD1117S33CTR	
25	1	Y1	32.768 KHZ SMD 12.5Pf	ABS25	535-9166-1-ND	ABS25-32.768KHZ-T	

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4.3 78M6612 AC-PMON Evaluation Board PCB Layouts

Figure 5: 78M6612 Evaluation Board PCB Top View



Figure 6: 78M6612 Evaluation Board PCB

UM_6612_013

4.4 USB Daughter Board Schematics



Figure 7: USB Daughter Board Electrical Schematic

4.5 USB Daughter Board Bill of Materials

					Digi-Key/Mouser		
Item	Q	Reference	Part	PCB Footprint	Part Number	Part Number	
1	2	C1,C2	4.7uF	RC1206	445-1606-1-ND	C3216X7R1E475K	
2	1	C3	0.1uF	RC0603	445-1314-1-ND	C1608X7R1H104K	
3	1	J1	US Connector	USBV	806-KUSBVX-BS1N-W	KUSBVX-BS1N-W	
						801-43-050-10-	
4	1	J2	HEADER 4	4X1PIN	ED6350-ND	001000	
5	1	R1	10K	RC0603	P10KGCT-ND	ERJ-3GEYJ103V	
6	1	U1	USB TO SERAIL IC	32QFN	895-FT232RQ	FT232RQ	
7	1	U2	OPTOISOLATER	8SOIC	ADUM3201ARZ-ND	ADUM3201ARZ	

5 Ordering Information

Part Description	Order Number
78M6612 AC-PMON Evaluation Board	78M6612-EVM-1

6 Included Documentation

The following 78M6612 documents are included on the CD:

78M6612 Data Sheet 6612_OMU_S2_URT_V1_13 Firmware Description Document

7 Contact Information

For more information about Teridian Semiconductor products or to check the availability of the 78M6612, contact us at: http://www.teridian.com/contact-us/

6440 Oak Canyon Road Suite 100 Irvine, CA 92618-5201

Telephone: (714) 508-8800 FAX: (714) 508-8878

Revision History

Revision	Date	Description
1.0	11/6/2009	First publication.
1.1	2/1/2010	Updated the schematics in Figure 3 and Figure 4.
		Updated the bill of materials in Table 2 and Table 3.

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