# *PocketShark*™ PCIe WatchDog Timer with Batteryless System Logger

# (SKU-091-11)

## Hardware Manual

**July 13, 2024**

**Revision 1.0**

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# 1 About this Document

## 1.1 Purpose

This document describes hardware installation, features, specification and operation of the *PocketShark* PCI Express WatchDog Timer with Batteryless System Logger™ from Amfeltec Corporation.

## 1.2 Feedback

AMFELTEC Corp. makes every effort to ensure that the information contained in this document is accurate and complete at the time of release. Please contact Amfeltec if you find any errors, inconsistency or have trouble understanding any part of this document.

To provide your feedback, please send an email to support@amfeltec.com

Your comments or corrections are greatly valued in our effort for excellence and continuous improvement.

## 1.3 Revision History

| Rev. No. | Description | Rev. Date |
|---|---|---|
| 1.0 | Initial Release. | July 13, 2024 |
| | | |
| | | |

# 2 General Description

## 2.1 Introduction

The PocketShark PCI Express WatchDog Timer board is the device that maximize the reliability of embedded appliance or IOT device that operate without human supervision. The Timer board is monitoring embedded appliance operation and can reboot the system in case system crash. The WatchDog Timer board is monitoring the signals from the appliance software that has to be send to the Timer in regular intervals. If the Timer board doesn't receive an expected signal with defined period of time, the Timer board generate the RESET signal for the motherboard to reboot system.

It is a 1U PCI Express board and connects to the motherboard via x1 PCI Express upstream connector. The WatchDog Timer board holds inside motherboard PCI express connector by using Amfeltec's PCI Express Retainer (US Pat. #7,850,475) without any brackets.

The Timer board can operate at industrial temperature rate (from -40°C up to +85°C).

## 2.2 Package Contents

PCIe WatchDog Timer with Batteryless System Logger package includes the following part:

1. WatchDog Timer with Batteryless System Logger
2. 2-pin control cable SKU-043-42 (optional)

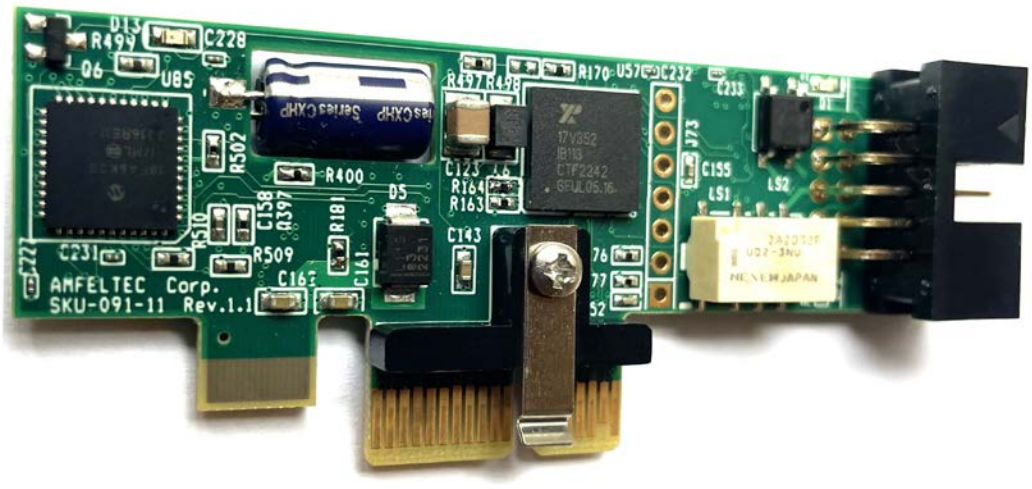


**Figure 1:** PocketShark PCIe WatchDog Timer

# 3 Features

## 3.1 Features

- Easy ‘Plug and Play” installation; no driver needed; transparent to the operation system.
- Compatible with any motherboard.
- 1U PCI Express form factor
- x1 PCI express upstream connection to motherboard
- WatchDog timer interval setting from 1 sec. to 4 min.
- Maximum switching voltage: 125 VAC/60VDC; current 1A
- No batteries or external power required for Logger operation
- Logger non-volatile memory 128 Mbyte
- No service or maintenance; life time over ten years
- Retained inside a computer without bracket by using Amfeltec PCIe Retainer (US.Pat. #9,996,475)
- Industrial operation temperature range from -40° C to +85°C
- Dimension: 2.6” x 1.8” (65 mm x 30 mm)
- RoHS compliant.

## 3.2 PCI Express WatchDog Timer connection.

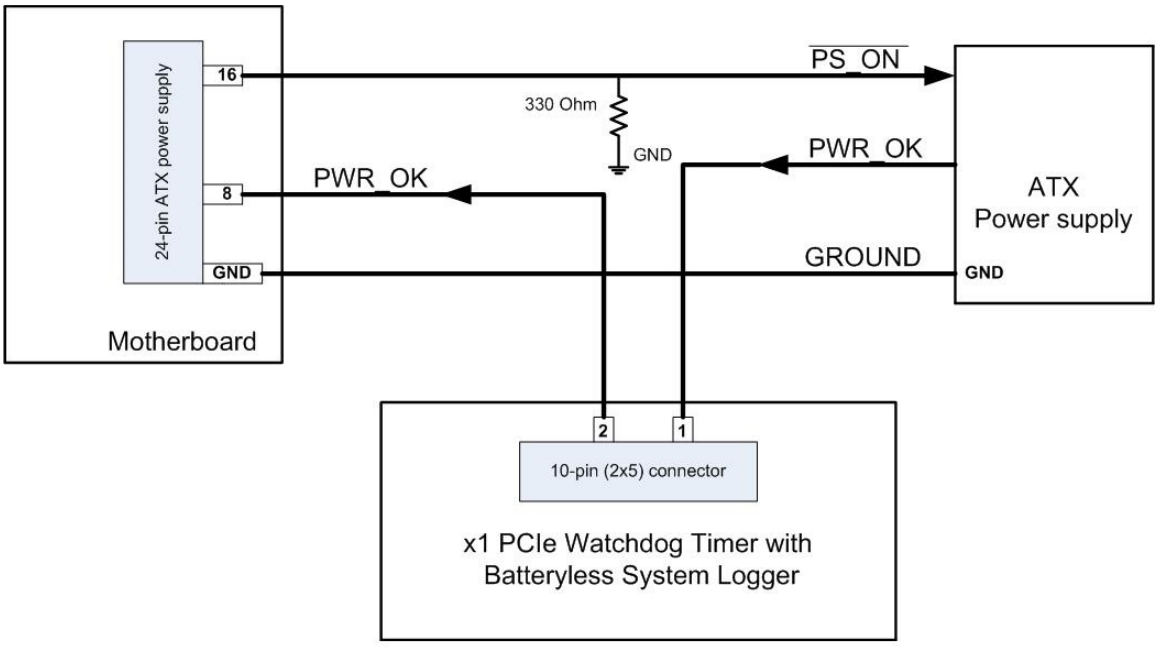


**Figure 2:** Connection diagram for motherboard without RESET pin.

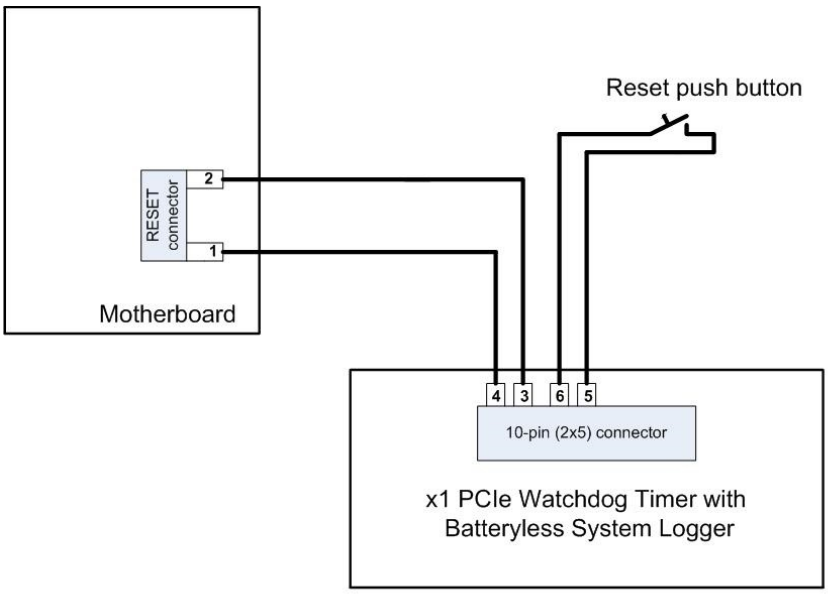


**Figure 3:** Connection diagram for motherboard with RESET pin.

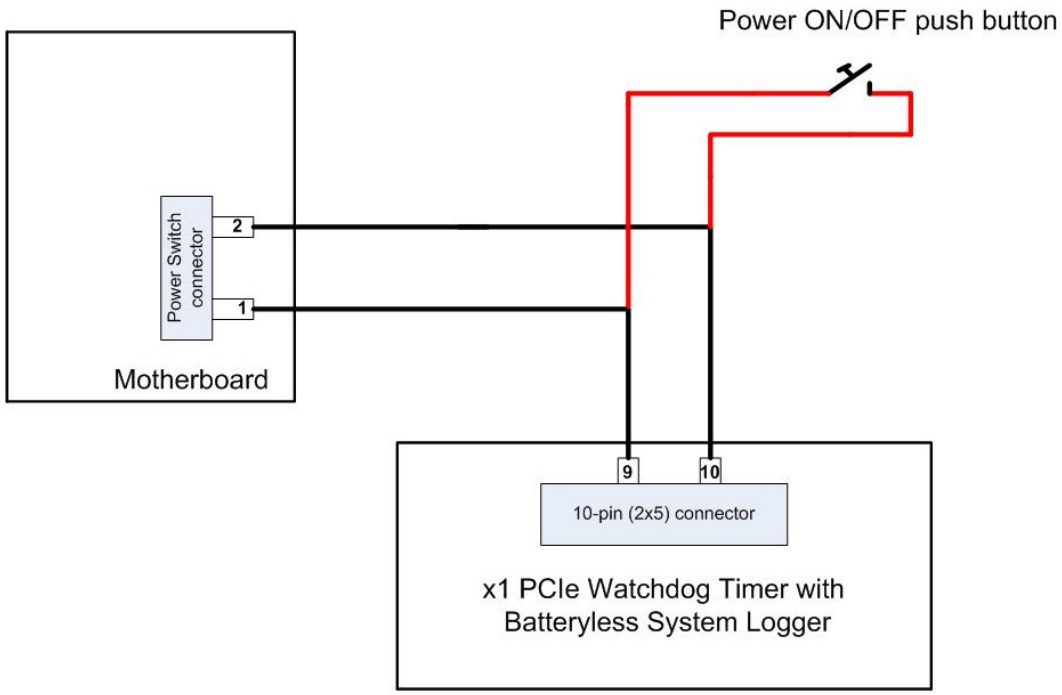


**Figure 4:** Connection diagram for motherboard with power connector.

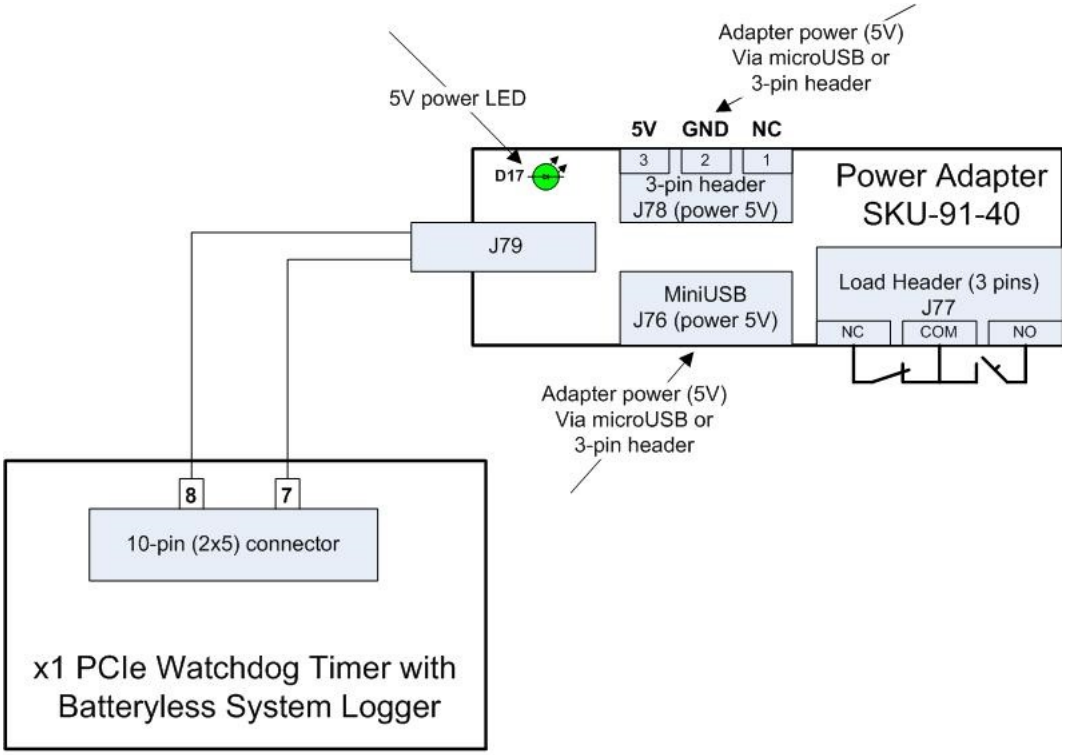


**Figure 5:** Connection diagram to Power Adapter SKU-091-40.

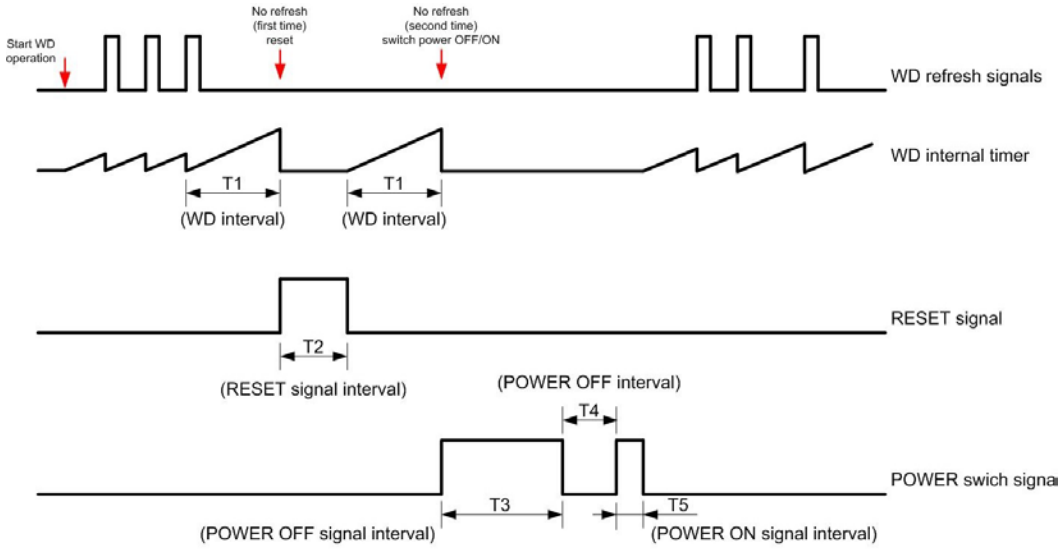


**Figure 6:** WatchDog Timer operation diagram.

# 4 Installation

## 4.1 WatchDog Timer board installation

The following steps provide the exact sequence that needs to be followed in order to properly install the Amfeltec PCIe WatchDog Timer board:

- Turn OFF the computer/appliance before installation
- Remove the chassis cover
- Locate an unused PCI express slot
- Insert the board into the appropriate PCI Express slot
- Put the chassis cover back
- Turn ON the computer

## 4.2 WatchDog Timer board Power ON

After computer Power ON the Timer has to be configured by using utility that setup the follow operation parameters:

- WatchDog timer interval (T1 interval on the timing diagram) (from 1 sec. to 4 min.- default 10 sec)
- Reset signal interval (T2 interval on the timing diagram) (from 10 ms. to 2.5 sec.- default 100 ms.)
- Power OFF signal interval (T3 interval on the timing diagram) (from 1 sec. to 4 min.- default 5 sec.)
- Power OFF wait interval (T4 interval on the timing diagram) (from 1 sec. to 4 min.- default 5 sec.)
- Power ON signal interval (T5 interval on the timing diagram) (from 10 ms. to 2.5 sec.- default 100 ms.)
- Activate WatchDog Timer

# 5 Software Package Installation

Download from the product Web page software package **Syslog-SKU-091-3x.tar.gz** and Untar it. The package has three folders – discovery, logger_x.x.x and watchdog_x.x.x

Make sure all utilities and scripts can be executed and current user has read/write/execute permissions.

Some of operations may require root privileges

All software provided under GPL license.

## 5.1 WatchDog and Logger device names discovery

Change working folder to '**discovery**'. Add folder to PATH.

Run the script: **source discovery.sh**

If successful, environment variables containing addresses of com ports opened by device will be created and exported. Make sure variables WD_COM_PORT and LOG_COM_PORT are created. They should contain com ports device addresses and be available for any terminal session.

## 5.2 WatchDog Timer Utility

Change working folder to 'watchdog_x.x.x' if necessary.

- Provided test application illustrates the way command line utility can be incorporated into calling software.

- Command line utilities can be executed from the terminal.

Utility provides command line interface that is incorporated in running application. Test_app (executable and source code) provides the usage example.
The utility format is as follows:
wd_serial [command] <parameters>
List of supported commands and parameters:
- info
- start
- start <0/1> <0/1> <0/1> - exactly three parameters
- stop
- refresh sec (optional – 'sec' parameter is needed when utility integrated into device software outside of main loop)
- set – no parameters – sets all timers to defaults
- set <timer1> <timer2> <timer3> <timer4> <timer5> - exactly five parameters

The size of all timing parameters have to be as one byte ( from 1 to 255).

The source code is included for the reference. The package is distributed under GNU General

Public License, user can modify code, remove or add debug printouts etc., and rebuild cli utility and test application.

Originally the package was built and tested on Ubuntu 22.04 (Makefile provided)

## 5.3 Batteryless System Logger Utility

Change working folder to ‘logger_x.x.x’. Add the target folder to PATH

Release includes the following:

Source codes and header files - provided under GPL license

logger and logger_debug executables (debug executable requires debug version of hardware)
Makefile - allows to build release and/or debug version of utility:
make or make logger - builds production version
make logger_debug - builds debug version (containing more debug output)
make logger logger_debug - builds both versions

Config file (settings.conf - used as input for set option, see below

Data subdirectory - with four samples of output for dump option. These files are rebuilt every time dump is called.

Make sure logger is connected and port is accessible.
Port configuration has to be the follow:
Baud rate 57600
Flow control None
Open Mode Read/Write
Data Bits 8
Parity None
Stop Bits 1
Input CR/LF set to None

Usage:
Run "/logger dump" to dump log data for analysis
Run "/logger info" to output general device information
Run "/logger ptest" to run production test
Run "/logger fstart" to start after production test
Run "/logger wrestart" to perform warm restart
Run "/logger set" to parse config file (settings.conf) and perform settings commands (see settings.conf file for details)

## 5.4 OS Kernel logging configuration (software)

Logging events like kernel panic in real time requires some advanced operations.

Make sure that all Kernel and system messages are forwarded to the COM port with System Logger.

Modify GRUB command line to add opened port to consoles.

# 6 Software

## 6.1 System Logger

System Logger doesn't require any additional software for operation. Kernel and GRUB configuration changes may be required for advanced options.

The Logger utility is required to perform configuration tasks and retrieve the data from the Device. The utility was developed and tested on Linux (Ubuntu 22.04)

## 6.2 Watchdog Timer

Watchdog Timer Logger doesn't require any additional software for operation. Watchdog utility is required to perform configuration tasks and retrieve device info.

Utility command line should be incorporated into device software – please refer to Test_app source (provided under GPL license) for working example.

Please contact support@amfeltec.com for more information.

# 7 Utilities Description

## 7.1 General Description

The Utilities communicates with Watchdog and System Logger by using internal protocol over com port interface.

## 7.2 Logger Utility output format

As the result of running the Utility command with “dump” option the follow text files will going to be created in the Data subdirectory:

1. File **status.txt** (table with environmental information)
2. File **acel.txt** (accelerometer information)
3. File **finarray.txt** (all information from logger including kernel log, system log and environmental information)
4. File **dump.txt** (raw data received from the logger)

# 8 Hardware Description

## 8.1 Connectors

| Ref. Des. | Type | Usage |
|---|---|---|
| JP2 | Connector | Connectors for Reset and Power control cables |
| U56 | Connector | Upstream x1 PCI Express connector |

**Table 1**: PCIe WatchDog Timer connectors

# 9 Appendix A: Limited warranty

Amfeltec Corporation does not warrant that the operation of the hardware, software or firmware products will be uninterrupted or error free. Amfeltec products are not intended to be used as critical components in life support systems, aircraft, military systems or other systems whose failure to perform can reasonably be expected to cause significant injury to humans. Amfeltec expressly disclaims liability for loss of profits and other consequential damages caused by the failure of any product which would cause interruption of work or loss of profits, such as shipboard or military attachment.

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