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AMIDebug™ Rx – User Manual

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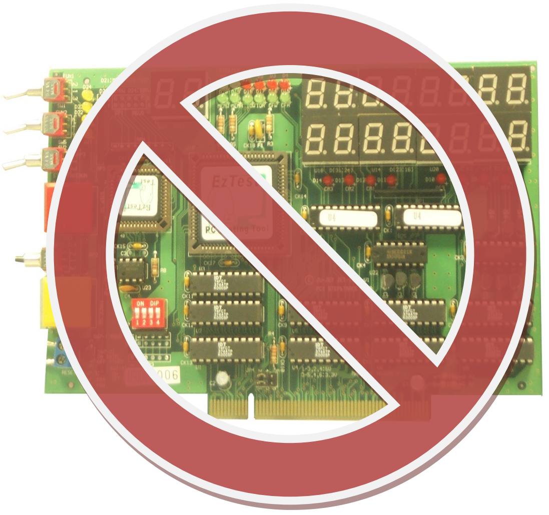
Overview

Introduction



AMIDebug™ Rx is a low-cost debug tool built around the debug port feature common to today's USB 2.0 EHCI controllers. Based on patent-pending technology, AMIDebug Rx is designed as replacement for the PCI POST Checkpoint Card, which is becoming less useful in the PC market as newer systems omit PCI expansion slots.

This product is targeted to power users, quality assurance labs & service technicians. Diagnosing platforms with AMIDebug Rx is non-intrusive, allowing technicians to access checkpoints without opening the case. AMIDebug Rx produces more descriptive debugging messages than the checkpoint card, along with extended features such as boot performance timing and UEFI debug message redirection.

Key Features

- USB-based replacement for the PCI port 80h "POST Checkpoint" card
- Checkpoints can be captured and stored to one of four "sessions" for later review
- Measures elapsed time between checkpoints to analyze boot performance timing
- Display descriptive text for each checkpoint, based on built-in string table or custom table
- USB Virtual COM (VCOM) port for data transfer and configuration
- Additional features for Aptio 4.x and AMIBIOS8 BIOS developers
    - UEFI debug messages[1] redirected over USB VCOM or saved in local memory
    - Enable source level debugging[2] via AMIDebug for Aptio and AMIDebug for AMIBIOS8

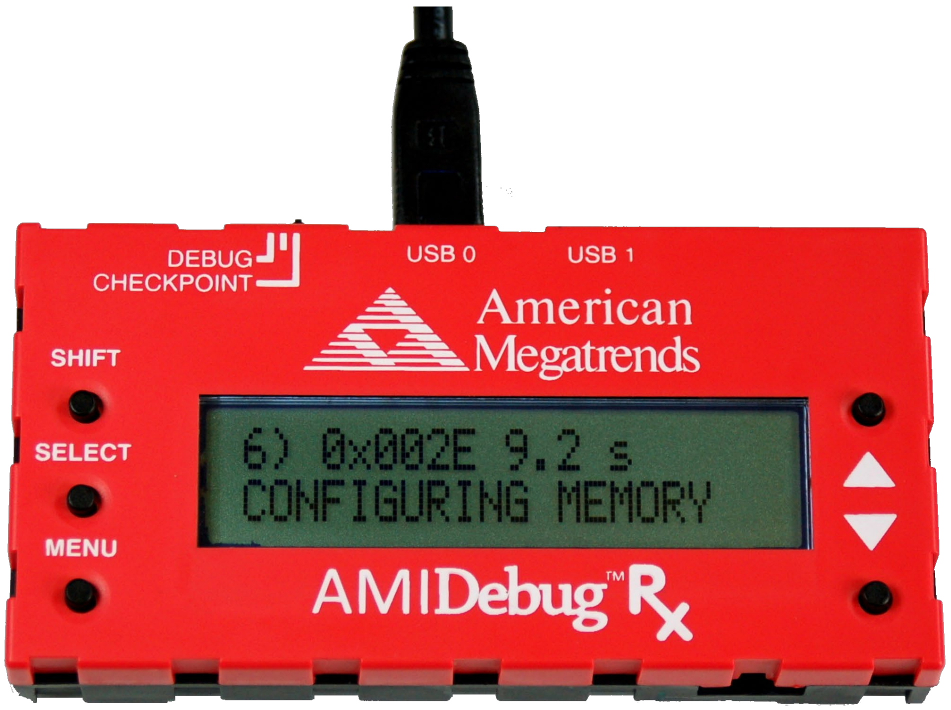
[1] Requires Aptio 4.x BIOS project to be compiled in debug mode

[2] Additional features available after-market using unlock code, available from AMI

References

AMI BIOS checkpoint references, available at www.ami.com

- AMIBIOS Checkpoint and Beep Codes
- Aptio 4.x Status Codes – Checkpoints and Beep Codes



Document Change History

Date	Rev	Description
2009-05-29	0.90	Release candidate draft, ready for customer review.
2009-06-10	0.91	Updated for firmware release v2.2.0. Added description of 'info' command. Updated help strings for terminal commands. Updated sample output of download strings & download session commands. Added new pictures.
2009-06-12	0.92	New troubleshooting tips added: Problems Installing USB Host-to-Host Debug Driver & Ayera TeraTerm Does Not Recognize Ports above COM4.
2009-06-18	0.93	Updated firmware version in `info` command example (v2.2.1)
2009-08-12	1.00	Updated firmware version in `info` command example (v2.3.0). Added `info` command example to unlock procedure. Added footnote for UEFI Debug Strings (pg. 8).
2009-11-05	1.10	Updated for v2.3.1 firmware. Added 'Erase Session' and 'Info' menu commands. Added marker for stored sessions in 'Save Session' and 'Load Session' dialogs.
2010-02-01	1.20	Updated for v2.3.2 firmware. Added notes on new confirmation messages. Updated copyright information for 2010.
2010-03-25	1.30	Updated for v2.3.4 firmware. Described usage with Microsoft Windows Kernel Debugging functionality via USB debug port (page 26). Corrected product name references for consistency with trademarks.
2010-07-13	1.40	Updated for v2.3.6 firmware. Updated VCOM terminal help text to match new entries.
2014-08-04	1.41	Updated link for downloading of VCP driver
2015-02-11	1.42	Update link for downloading of VCP Driver

2017-04-27	1.43	Updated for v3.4.1 firmware.
2020-02-14	1.44	Updated AMI logo and company name from American Megatrends, Inc. to AMI.

Getting Started with AMIDebug Rx

What's in the Box?

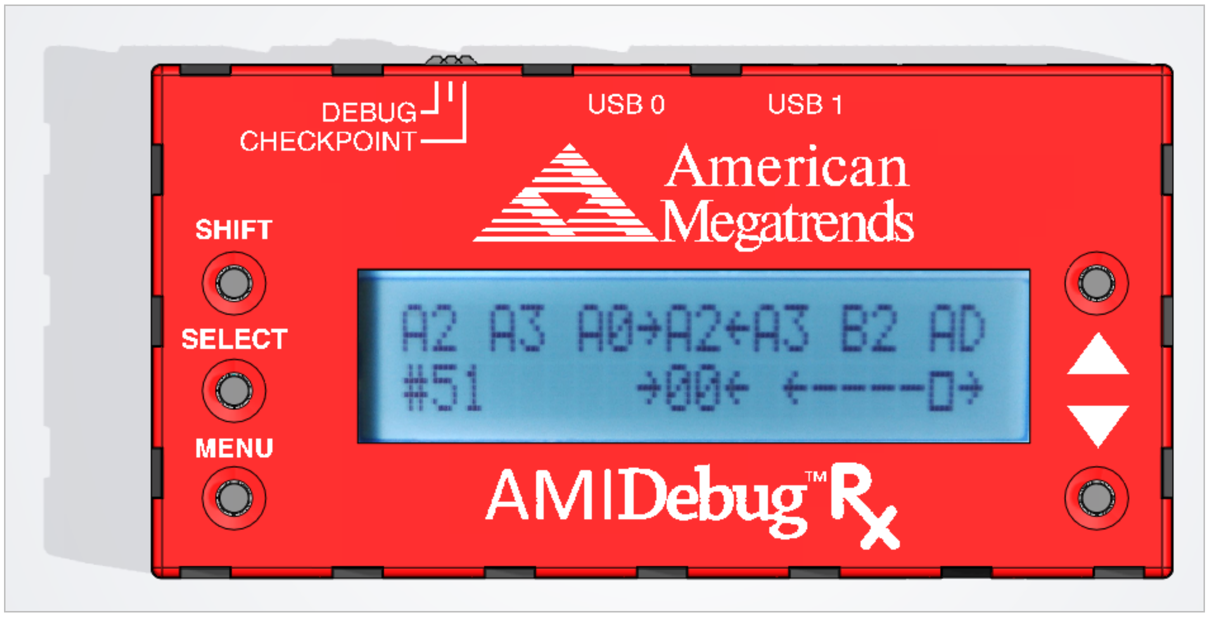
One (1) AMIDebug Rx Device

Two (2) USB 2.0 A/Mini-B 4-pin device cables

AMIDebug Rx Quick Start Guide

CD-ROM, including electronic documentation and VCOM drivers

AMIDebug Rx Layout



USB0 LED – indicates connection (ON) & activity (BLINK) for USB CONNECTOR 0

USB1 LED – indicates connection (ON) & activity (BLINK) for USB CONNECTOR 1

SHIFT – Used in checkpoint mode to change checkpoint display format

SELECT – Used in menu navigation, also used in checkpoint mode to checkpoint display format

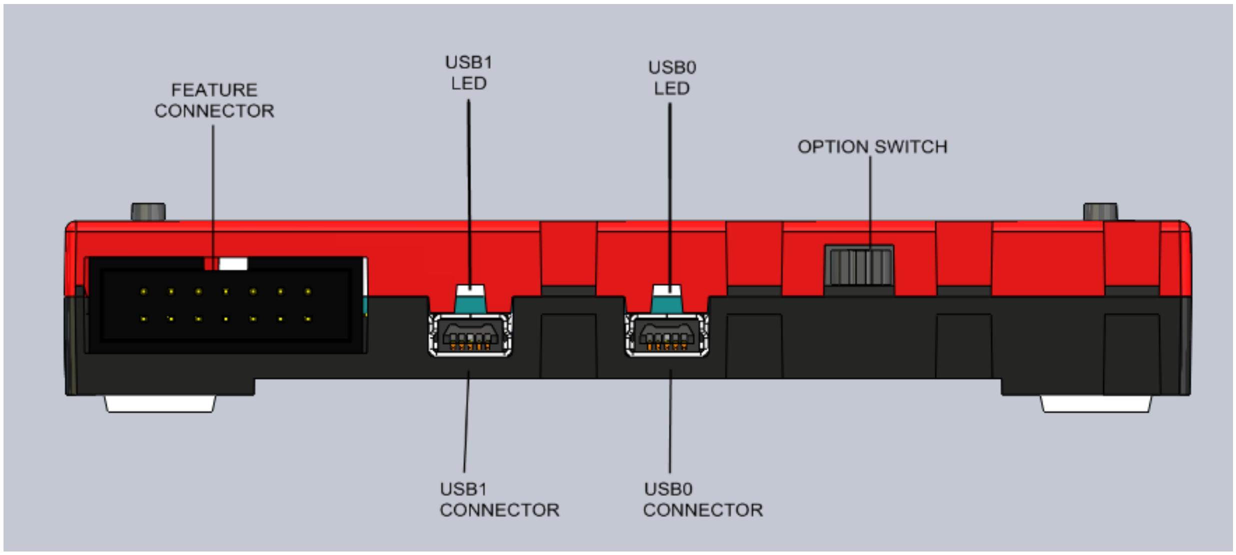
MENU – Used to enter & exit menu

▲ – Used in menus to select next entry, also used in checkpoint mode to navigate buffer

▼ – Used in menus to select previous entry, also used in checkpoint mode to navigate buffer

OPTION SWITCH – Used to select debug mode (LEFT) or checkpoint mode (RIGHT). Center position is reserved for future use.

FEATURE CONNECTOR – Reserved for future use



Using AMIDebug Rx

AMIDebug Rx has three basic usage models …

1. Connect AMIDebug Rx to a system under test (SUT) at boot up to view BIOS checkpoints, capture UEFI debug strings[3] and store checkpoint sessions to local memory.
2. Connect AMIDebug Rx to a computer after boot and use the Virtual COM (VCOM) terminal to retrieve checkpoint sessions, upload new checkpoint string tables and view UEFI debug strings in real-time during the boot process.
3. Use AMIDebug Rx to connect a debug host & target for use with AMI Debug source-level debugging tools (*AMIDebug for UEFI* or *AMIDebug for AMIBIOS8*).

[3] UEFI debug strings are only available on UEFI BIOS compiled in "debug mode" and may not be visible on commercially shipping BIOS products.

Using AMIDebug Rx for BIOS Checkpoints

Identifying Systems That Support AMIDebug Rx

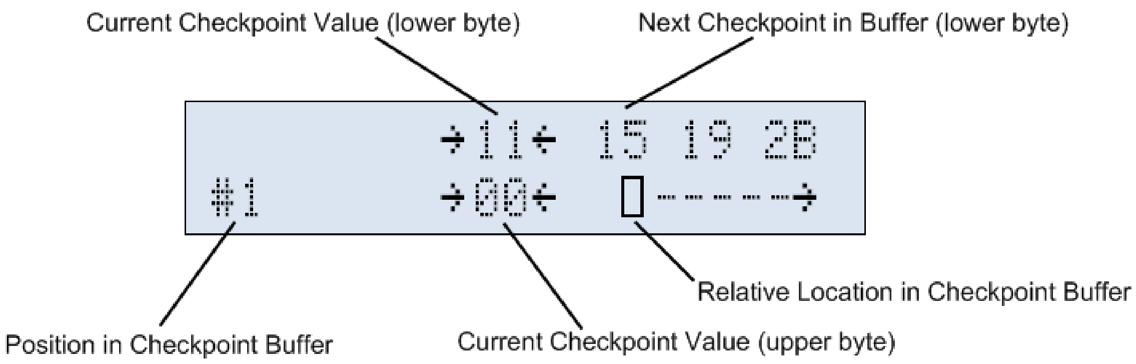
Systems supporting AMIDebug Rx functionality will have a support string present in the BIOS Setup, under the Advanced menu ("AMI Debug Rx Enabled!"). The manufacturer's documentation may also indicate that AMIDebug Rx is supported.

Locating the USB Debug Port

AMIDebug Rx will only communicate with the system under test on the "USB debug port." Please refer to the manufacturer's documentation to locate this port.

Checkpoint Functionality

Turn off the system under test (SUT). Set the OPTION SWITCH to checkpoint mode (RIGHT) and connect the AMIDebug Rx to the USB debug port on the SUT. Turn on the SUT. AMIDebug Rx will power on and start displaying data sent to the USB debug port. By default POST checkpoints are displayed in a right justified format.


Current Checkpoint Value (lower byte)
Next Checkpoint in Buffer (lower byte)
→11← 15 19 2B
#1 →00← ▯-----→
Relative Location in Checkpoint Buffer
Position in Checkpoint Buffer
Current Checkpoint Value (upper byte)

Changing the Checkpoint Display Format

The SELECT button is used switch the display mode, showing the same checkpoint data with string descriptions and timing information. Descriptions are based on the lower checkpoint byte only.

```
23)   0x7800  10  s
ACPI  modul e  i ni t
```

While in CHECKPOINT mode, the SHIFT key also affects the display mode. Checkpoint lower-byte values are displayed on the bottom line, while the checkpoint upper-byte value and progress bar are shown on the top.

```
           11} 15£  19  2B 2C
#2            } 00£   £▯----}
```

▼ ▼ ▼

```
#2            } 00£   £▯----}
           11} 15£  19  2B 2C
```

When using string displays, SHIFT switches the word based checkpoint value between “big endian" and “little endian" byte order.

```
23)   0x7800  10  s
ACPI  modul e  i ni t
```

▼ ▼ ▼

```
23)   0x0078  10  s
ACPI  modul e  i ni t
```

Viewing Checkpoint History

Checkpoints in a current session are viewed using the UP/DOWN buttons (▲/▼).

```
              } 11£   15  19  2B
#1            } 00£   ▯-----}
```

▼

```
           11} 15£  19  2B 2C
#2            } 00£   £▯----}
```

▼

```
        11  15} 19£2B 2C 2E
#3              } 00£  £▯----}
```

▲

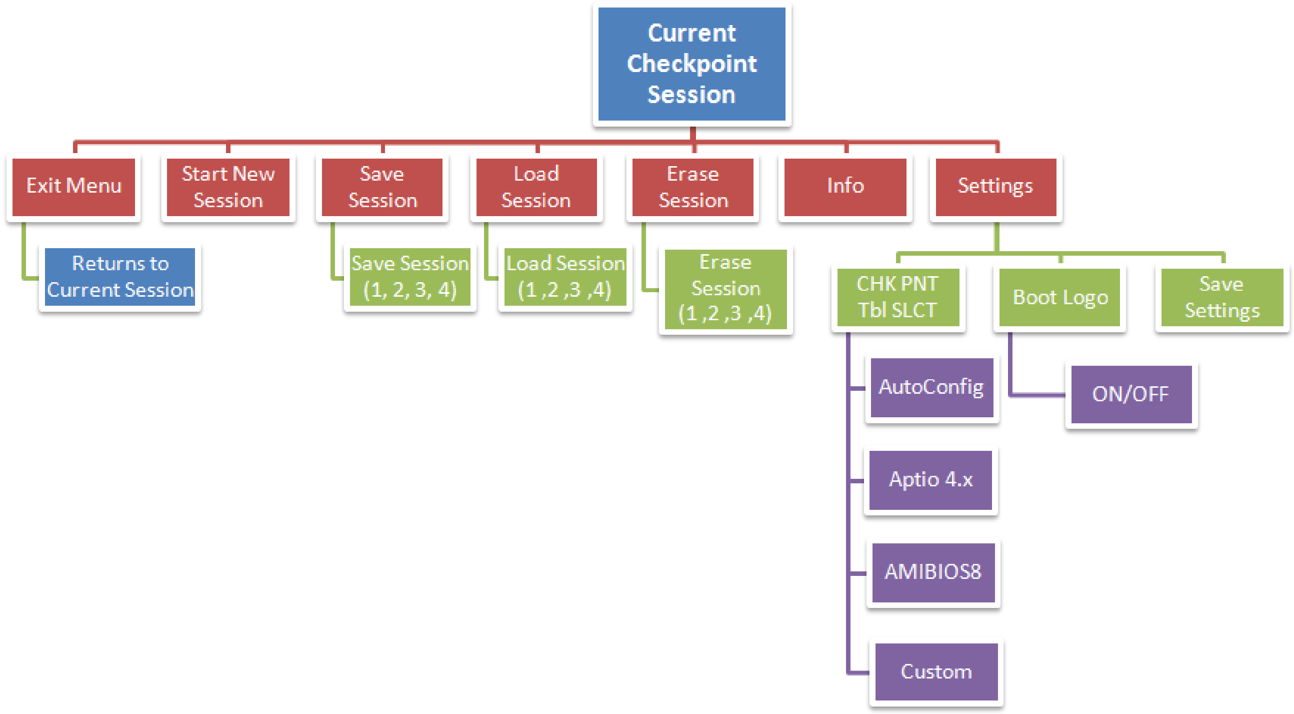
```
           11} 15£  19  2B 2C
#2            } 00£   £▯----}
```

AMIDebug Rx Menu Reference

Using the Device Menu

- When operating in checkpoint mode, use the MENU button to enter the device menu
- Use the arrow keys to navigate
- The SELECT switch is used to select options and sub-menus
- The SHIFT key has no assigned function in the sub-menus
- Use the MENU key to exit any sub-menu

Menu Structure



Exit Menu

The Exi t Menu option is used to exit the menu and return to the current checkpoint session.

```
Main Menu:
1) Exit Menu
```

Start New Session

The Start New Session option allows the user to create a new blank session to begin saving debugging messages within.

```
Main Menu:
2) Start New Session
```

Save Session

The Save Session option allows the user to save the current checkpoint session into one of four data areas (1, 2, 3, 4), for later viewing. The data is stored in flash memory on the device.

```
Main Menu:
3) Save Session
```

Use the SELECT button to select a session. Any existing data in the session will be overwritten.

```
Save Session:
   }1   2   3   4
```

Sessions containing saved data are noted by an asterisk (*) to the right of the session number.

```
Save Session:
   }1*   2   3   4
```

Note: Saving over a session already containing data will prompt the user to overwrite the session or cancel the save operation. Select 'Y' to continue or 'N' to cancel the operation.

```
Overwrite session?
      Y    }N
```

Once a session is saved the device will display a confirmation message and then return to the menu. To retrieve a saved session, use the Load Session menu command or the `download` & `display` terminal commands.

The saved session includes all checkpoint data and UEFI debug strings stored since the last new session was started. Checkpoint data can be viewed using the Load Session menu command or the `download` & `display` terminal commands. UEFI debug strings from a saved session can only be viewed using the `download` & `display` terminal commands.

Load Session

The Load Session menu allows the user to load a previously saved checkpoint session.

```
Main Menu:
4)  Load Session
```

```
Load Session:
   }1    2    3    4
```

Loading a saved session will overwrite the current session in memory. Make sure to save the current session to avoid losing useful data.

Sessions containing saved data are noted by an asterisk (*) to the right of the session number.

```
Load Session:
   }1*    2    3    4
```

Loading an empty session will produce the following results.

```
             }00£
#1           }00£ ▯-----}
```

A previously saved session will display data in the same way a current session is displayed.

```
#1         }00£   ▯-----}
           }11£  15  19  2B
```

Checkpoint data can be viewed using the Load Session menu command or the `download` & `display` terminal commands. UEFI debug strings from a saved session can only be viewed using the `download` & `display` terminal commands.

Erase Session

The Erase Session option allows the user to erase any stored checkpoint session in the four data areas (1, 2, 3, 4). This performs the same function as the `erase` command in the VCOM terminal.

```
Main Menu:
5)  Erase Session
```

Use the SELECT button to select a session, or use the MENU button to return to the previous menu without erasing any data. Sessions containing saved data are noted by an asterisk (*) to the right of the session number. Erasing sessions containing data will prompt the user if they wish to overwrite. Select 'Y' to continue operation or 'N' to cancel.

```
Erase Session:
   }1*    2    3    4
```

Note: Erasing a session already containing data will prompt the user to confirm the erase operation. Select 'Y' to continue or 'N' to cancel the operation.

```
Overwrite session?
      Y    }N
```

Note: This operation has no 'undo' and may take several seconds to complete.

Once a session is erased the device will display a confirmation and then return to the menu.

Info

The `Info` option displays the AMIDebug Rx hardware version and firmware revision.

```
Main Menu:
6) Info
```

This is the same information displayed on the device's boot screen, but can be accessed without resetting the device.

```
    AMI Debug Rx
     980F v3.4.0
```

After viewing the information, press SELECT or MENU to return to the previous menu.

Settings

The `Settings` menu & sub menus allows the user to customize the look & feel of various features.

```
Main Menu:
7) Settings
```

Chk Pnt Tbl Select

```
Settings:
1) Chk Pnt Tbl Slct
```

The "Checkpoint Table Select" (`Chk Pnt Tbl Slct`) option determines the checkpoint string table used to translate POST Checkpoint values. For more information on string tables, refer to the "Upload" command in the "Terminal Commands" section of this manual.

```
Chk Pnt Tbl Slct:
1) Autoconfig
```

With the `Autoconfig` option, AMIDebug Rx will use BIOS data to determine the correct checkpoint table.

```
Chk Pnt Tbl Slct:
2) Aptio 4.x
```

The `Aptio 4.x` option will force checkpoint string lookups to use Aptio 4.x data (string table 1)

```
Chk Pnt Tbl Slct:
3) AMIBIOS8
```

The AMIBIOS8 option will force checkpoint string lookups to use AMIBIOS8 data (string table 2)

```
Chk Pnt Tbl Slct:
4) Custom
```

The Custom option will force checkpoint string lookups to use a user-provided table (string table 3)

Boot Logo

```
Settings:
2) Boot Logo
```

The Boot Logo option determines if the sign on message is displayed at power on.

```
Settings:
1) On
```

The On option will enable the displaying of the sign on message, including the current firmware version.

```
Settings:
2) Off
```

The Off option will disable the displaying of the sign on message.

Save Settings

```
Settings:
3) Save Settings
```

The Save Settings option will store user preferences in the Settings menu (Chk Pnt Tbl Slct & Boot Logo) for use at the next device power-on.

Using AMIDebug Rx VCOM Functionality

USB Virtual COM (VCOM) Terminal

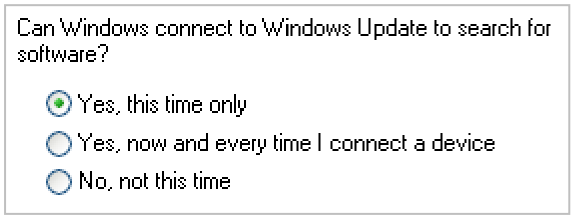
AMIDebug Rx uses a text terminal interface to retrieve stored data and configure the device. This interface allows flexible configuration options without the need for specialized software. The VCOM Terminal is enabled when the OPTION SWITCH is set to checkpoint mode (RIGHT position).

The VCOM Terminal user interface works with terminal programs such as Ayera TeraTerm and Microsoft HyperTerminal. AMI recommends using Ayera TeraTerm for any of the VCOM functionality that uses XMODEM[4] transfers.

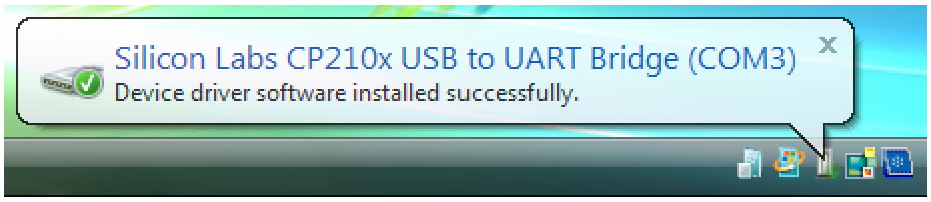
VCOM allows AMIDebug Rx users to retrieve stored information such as checkpoint sessions, UEFI debug strings and checkpoint string files.

Configuring the Device (Microsoft Windows)

AMIDebug Rx uses a “Silicon Labs CP210x USB to UART” under Microsoft Windows XP & Vista to map the device to a COM port address. This driver is available via Microsoft Update, so the “Found New Hardware Wizard” can connect to the Internet and install the proper driver. If prompted to connect to Windows Update, use the “Yes, this time only” option to automatically locate and load the device driver.

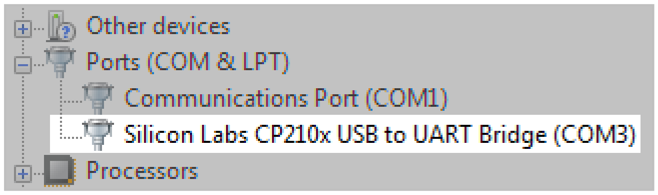

Can Windows connect to Windows Update to search for software?

[✓ Yes, this time only]
Yes, now and every time I connect a device
No, not this time


Silicon Labs CP210x USB to UART Bridge (COM3)
Device driver software installed successfully.

The Silicon Labs CP210x USB to UART driver can also be downloaded and installed manually. The driver can be found in the supplemental files download located here: https://www.ami.com/download-license-agreement/?DownloadFile=AMI_Debug_Rx_Supplemental_Files_Version_3.4.1.zip

Once the driver loads, the VCOM port will appear as a standard COM port under Microsoft Windows systems. Use the Device Manager to determine the COM port number (COM4, COM5, COM6, etc.). The AMIDebug


Other devices
Ports (COM & LPT)
Communications Port (COM1)
Silicon Labs CP210x USB to UART Bridge (COM3)
Processors

[4] Due to differences between the Microsoft HyperTerminal XMODEM implementation and the standard XMODEM protocol, the AMIDebug Rx “upload” VCOM command is not compatible with HyperTerminal. Other terminal programs will support AMIDebug Rx using XMODEM, including Ayera TeraTerm.

Rx VCOM port is associated with the “CP210x USB to UART Bridge Controller” driver.

Configuring the Terminal

Use the COM port number listed in Device Manager to configure the terminal program.

Recommended COM Settings: 115200 baud, 8 bit, no parity, 1 stop bit, hardware flow control.

Once the connection is established, hit the `ENTER` key to confirm the connection is active. If the connection is active, the user will see the following prompt:

```
Invalid command! Enter help for a list of valid commands.
```

Terminal Commands

A summary of terminal commands is generated by typing `help` at the command prompt.

```
help

Command list:

Help - This help menu.
Upload - Upload a string file to the device.
Download - Download a session or string file from the device.
Display - Dump a session or string table to the console.
Erase - erase a session or string table from the device.
Info - Display information about device.

Enter “help <command>” for further information.
```

Upload

The `upload` command uses the XMODEM protocol to upload a custom string table to the device’s local memory. The uploaded file is in ASCII TXT format.

```
Upload:
  upload <type> <select>

Upload a string file to the device using the xmodem protocol.
Tested to work with TeraTermPro.

type:
  strings - Upload a check point string table.

select:
  1 through 3
         1 - Aptio
         2 - AMIBIOS8
         3 - Custom

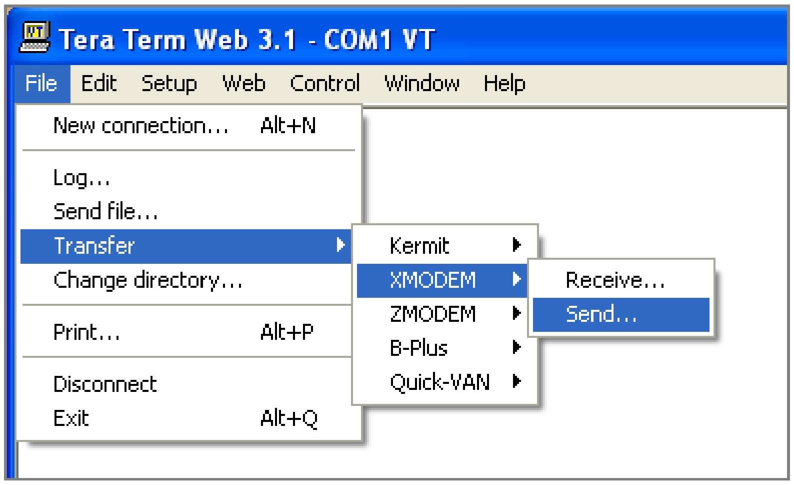
example:
  upload strings 2 - Uploads a new AMIBIOS8 string table to device
```

This operation changes the strings displayed by AMIDebug Rx that correspond to BIOS checkpoint values. The string table used by the device is selected in the `Settings` menu.

- String table 1 is reserved for AMI Aptio 4.x.
- String table 2 is reserved for AMIBIOS8.
- String table 3 is set aside for custom checkpoint string tables.

To generate a custom checkpoint string table, use the download command to extract an existing string file as the starting point for the new checkpoint string table.

After issuing the `upload` command in the terminal, an XMODEM "send" transfer must be initiated to transfer the text file to the AMIDebug Rx device. This is initiated from the terminal program used to access AMIDebug Rx via the VCOM terminal.



Download

The `download` command uses the XMODEM protocol to retrieve a stored session or string table from the device's local memory. The downloaded file is in ASCII TXT format.

```
Download:
  download <type> <select>

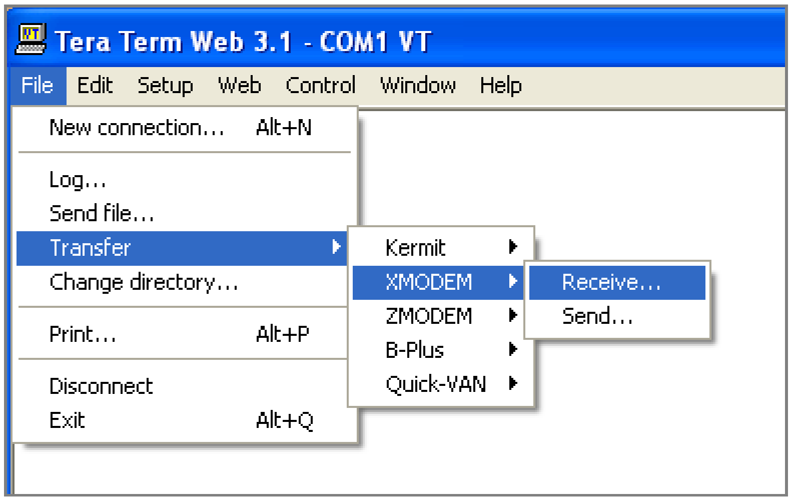
Download a session or string file from the device using the xmodem
protocol. Tested to work with TeraTermPro.

type:
  session - Download a session log.
  strings - Download a check point string table.
select:
  For session, 1-4.
  For strings, 1-3
         1 – Aptio
         2 – AMIBIOS8
         3 – Custom

example:
  download session 3 – Starts download of session 3 to host
```

- Sessions 1-4 correspond to the checkpoint capture sessions used by the Load Sessi on and Save Sessi on menu commands
- String table 1 is reserved for AMI Aptio 4.x.
- String table 2 is reserved for AMIBIOS8.
- String table 3 is set aside for custom checkpoint string tables.

After issuing the `download` command in the terminal, an XMODEM "receive" transfer must be initiated to transfer the text file from the AMIDebug Rx device. This is initiated from the terminal program used to access AMIDebug Rx via the VCOM terminal.



For an example of the output generated by the `display` command, please refer to the "Terminal Output Examples" section at the end of this document.

Display

```
Display:
  display <type> <select>

Display a session or string file from the device to the terminal.
Works with all terminals.

type:
  session - Download a session log.
  strings - Download a check point string table.

select:
  For session, 1-4.
  For strings, 1-3

subtype (optional, session only):
  cp - Only display checkpoints (and associated strings)
  string - Only display debug strings, 1-3

example:
display session 1 cp - Displays session 1 checkpoints on host terminal
```

The `display` command dumps a stored session or string table from the device's local memory. This differs from the `download` command since it directly outputs the data into the terminal buffer. This allows the data to be captured and saves using the terminal's memory buffer.

- Sessions 1-4 correspond to the checkpoint capture sessions used by the Load Sessi on and Save Sessi on menu commands
- String table 1 is reserved for AMI Aptio 4.x.
- String table 2 is reserved for AMIBIOS8.
- String table 3 is set aside for custom checkpoint string tables.

For an example of the output generated by the `display` command, please refer to the "Terminal Output Examples" section at the end of this document.

Erase

The `erase` command removes a stored session or string table from the device's local memory.

```
Erase:
  erase <type> <select>

Erase a session or string table from the device.

type:
  session - Erase a session log.
  strings - Erase a check point string table.
select:
  For session, 1-4.
  For strings, 1-3

example:
erase strings 1 - Erases Aptio string table from device
```

- Sessions 1-4 correspond to the checkpoint capture sessions used by the Load Sessi on and Save Sessi on menu commands
- String table 1 is reserved for AMI Aptio 4.x.
- String table 2 is reserved for AMIBIOS8.
- String table 3 is set aside for custom checkpoint string tables.

Erasing string tables 1 or 2 is not recommended. Keep a backup of any string table using the download or display commend prior to using the erase command.

Info

The `info` command displays information about the AMIDebug Rx device, such as the unit serial number, hardware version and firmware version. The `info` command has no input parameters.

```
info

AMI Debug Rx
(C)Copyright 2017, American Megatrends, Inc.

Serial number    : 9800000001
Hardware version: 980F
Firmware version: 3.4.1
```

Device Firmware Update

Connect to AMIDebug Rx via the VCOM terminal to start a firmware update. Refer to the “Using AMIDebug Rx VCOM Functionality” section of this manual for more information. Firmware updates may be supplied to add new features or fix issues found in AMIDebug Rx products.

From within the Terminal Window type `upload firmware` and hit ENTER.

```
upload firmware
Please upload new firmware through xmodem
Waiting.......
```

Start an XMODEM “send” transaction from the terminal program to transfer the new firmware file to the device as a “User ROM”. The User ROM is loaded into a special buffer in the AMIDebug Rx on-board memory. The LCD screen will show the following message while the file is being transferred …

```
Incoming firmware
Please wait...
```

After the upload is successful, remove power from the unit by disconnecting all USB cables.

Press & hold all three buttons on the left-side of the device (SHIFT, MENU, SELECT), then reconnect the USB cable used for the VCOM terminal. This will supply power to the device. Release the SHIFT/MENU/SELECT buttons once the device powers on. After releasing the SHIFT/MENU/SELECT buttons, the following messages will appear on the LCD panel & cycle every few seconds.

```
Bootload Menu Press:
Shift for User ROM
```

```
Bootload Menu Press:
Slct for Factory ROM
```

```
Bootload Menu Press:
Menu to exit
```

If the User ROM (SHIFT) or Factory ROM (SELECT) options are selected, the flash update process will begin. The following message will flash on the screen during the flash upgrade …

```
Updating Firmware...
```

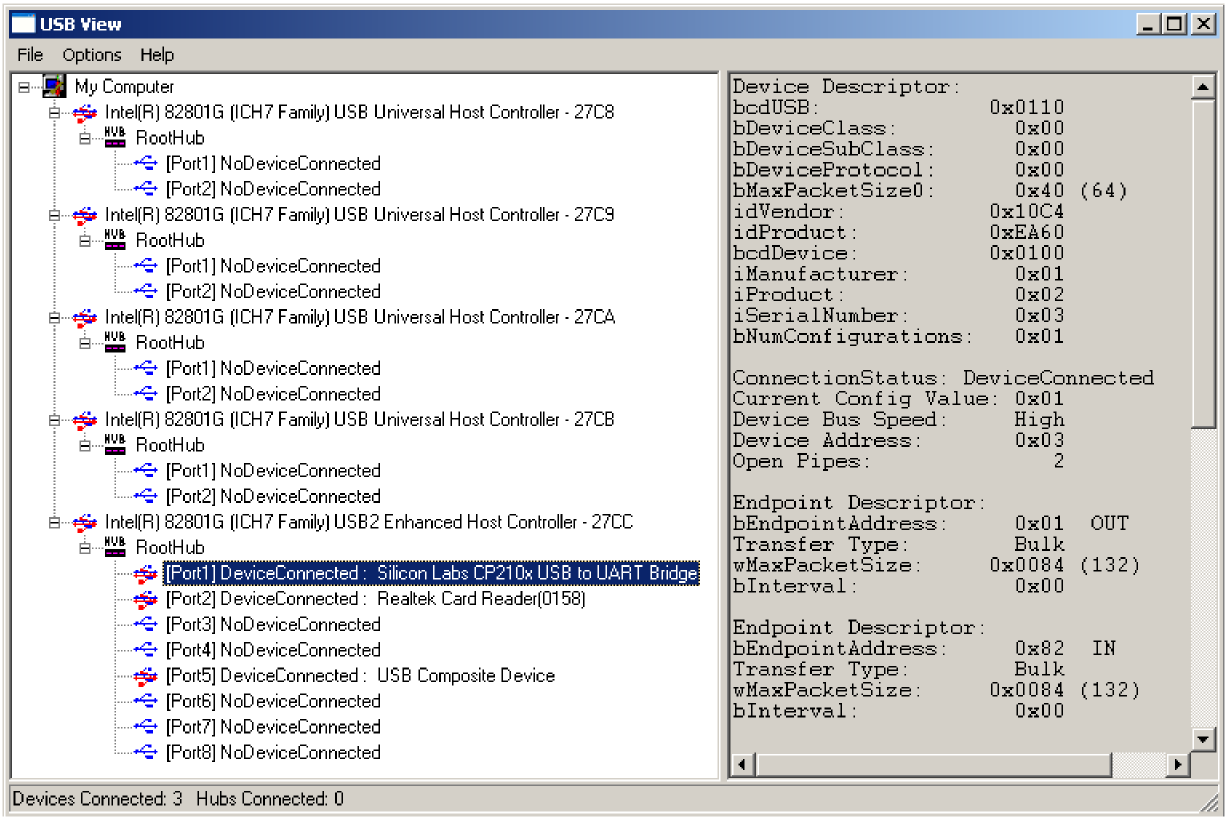
Do not disconnect the USB cable from the device while the firmware update process is underway. Removing the USB cable will disconnect the power and may corrupt the flash.

Upon successful flashing the AMIDebug Rx device will reset using the new firmware image.

To skip flashing, hit the MENU button. The device will reset using the existing firmware image.

Cannot Locate USB Debug Port

System documentation will not always clearly identify the USB debug port used with AMIDebug Rx. There are utilities that can help locate the port, such as free Microsoft USBView (USB Connection Viewer) program. The debug port is typically the device connected to **[Port1]** on the "USB2 Enhanced Host Controller" or "EHCI" interface.



```
My Computer
  Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C8
    RootHub
      [Port1] NoDeviceConnected
      [Port2] NoDeviceConnected
  Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27C9
    RootHub
      [Port1] NoDeviceConnected
      [Port2] NoDeviceConnected
  Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CA
    RootHub
      [Port1] NoDeviceConnected
      [Port2] NoDeviceConnected
  Intel(R) 82801G (ICH7 Family) USB Universal Host Controller - 27CB
    RootHub
      [Port1] NoDeviceConnected
      [Port2] NoDeviceConnected
  Intel(R) 82801G (ICH7 Family) USB2 Enhanced Host Controller - 27CC
    RootHub
      [Port1] DeviceConnected :  Silicon Labs CP210x USB to UART Bridge
      [Port2] DeviceConnected :  Realtek Card Reader(0158)
      [Port3] NoDeviceConnected
      [Port4] NoDeviceConnected
      [Port5] DeviceConnected :  USB Composite Device
      [Port6] NoDeviceConnected
      [Port7] NoDeviceConnected
      [Port8] NoDeviceConnected
```

```
Device Descriptor:
bcdUSB:             0x0110
bDeviceClass:         0x00
bDeviceSubClass:      0x00
bDeviceProtocol:      0x00
bMaxPacketSize0:      0x40 (64)
idVendor:           0x10C4
idProduct:          0xEA60
bcdDevice:          0x0100
iManufacturer:        0x01
iProduct:             0x02
iSerialNumber:        0x03
bNumConfigurations:   0x01

ConnectionStatus: DeviceConnected
Current Config Value: 0x01
Device Bus Speed:     High
Device Address:       0x03
Open Pipes:              2

Endpoint Descriptor:
bEndpointAddress:     0x01  OUT
Transfer Type:        Bulk
wMaxPacketSize:     0x0084 (132)
bInterval:            0x00

Endpoint Descriptor:
bEndpointAddress:     0x82  IN
Transfer Type:        Bulk
wMaxPacketSize:     0x0084 (132)
bInterval:            0x00
```

```
Devices Connected: 3   Hubs Connected: 0
```

AMIDebug Rx Does Not Power On

AMIDebug Rx is a "bus powered" USB device, so it draws power from the USB connection (USB0 and USB1). If the computer connected to AMIDebug Rx is powered off, then the device will shutdown.

AMIDebug Rx can draw power from the USB0 & USB1 connectors at the same time. If one of the connectors is attached to a running system then power will not be lost of the other system is turned off. Note that saved sessions are not lost when power is removed from the device.

AMIDebug Rx Does Not Display Checkpoint Data

1. Is the OPTION SWITCH set to CHECKPOINT mode? If not, change the switch position and reset the system under test (SUT).

2. Was AMIDebug Rx connected after the SUT was powered on? AMIDebug Rx must be connected before the SUT is powered on or prior to a system reset. If AMIDebug Rx is not detected at reset, then checkpoints over the USB debug port are disabled. Reset the system after AMIDebug Rx has been connected.
3. Does the BIOS support AMIDebug Rx functionality? Check for the support string in BIOS setup ("AMIDebug Rx Enabled!") under the Advanced menu, or refer to the system documentation.
4. Is the device connected to the USB debut port on the SUT? If the USB debug port is not properly identified by the manufacturer, then try each port (reconnect, reset, observe result).

AMIDebug Rx Does Not Properly Display Checkpoint Strings

The SELECT button is used switch the display mode, showing the same checkpoint data with string descriptions and timing information. Verify that the "Checkpoint Table Select" menu option is configured correctly. This option sets the checkpoint string table used to translate POST Checkpoint values.

```
Settings:
1) Chk Pnt Tbl Slct
```

- `Autoconfig` - AMIDebug Rx will use BIOS data to determine the correct checkpoint table.
- `Aptio 4.x` - force checkpoint string lookups to use Aptio 4.x data (string table 1)
- `AMIBIOS8` - force checkpoint string lookups to use AMIBIOS8 data (string table 2)
- `Custom` - force checkpoint string lookups to use a user-provided table (string table 3)

AMIDebug Rx Checkpoint Strings Are Corrupted or Blank

If checkpoint strings are corrupted, or the area where the string should be is blank, then the string tables stored in AMIDebug Rx device may be corrupted. These string tables can be restored using the VCOM terminal interface.

Use the `erase` command to clear a string table (example: `erase strings 1`).

Use the `upload` command to upload a replacement string table (example: `upload strings 1`).

- String table 1 is reserved for AMI Aptio 4.x.
- String table 2 is reserved for AMIBIOS8.
- String table 3 is set aside for custom checkpoint string tables.

AMIDebug Rx Does Not Work Using USB Hub

AMIDebug Rx will only work when directly connected to the USB debug port on the system under test. A USB hub cannot be used with the USB debug port.

VCOM Does Not Connect Using USB Hub

When connecting the AMIDebug Rx to a computer to access the VCOM terminal, it is recommended to directly connect the device to one of the system USB ports. If a USB hub is used it must comply with the USB 2.0 Specification. An older USB hub (USB 1.1 Specification) will not work with AMIDebug Rx.

Device Firmware Update Problems

If an error occurs, during the flashing process, one of the following failure messages will appear …

```
Failed to Flash
```

```
Menu to Reset
```

If the new firmware file does not update properly, users can revert to the factory firmware image. Press & hold all three buttons on the left-side of the device (SHIFT, MENU, SELECT) then reconnect the USB cable used for the VCOM terminal. Select `Slct for Factory ROM` to revert to the original firmware.

Problems Installing USB Host-to-Host Debug Driver

When the AMIDebug Rx OPTION SWITCH is set to DEBUG for USB Host-to-Host debugging, the debug host running Microsoft Windows requires an additional driver. This driver is supplied in the `Host.zip` file included with AMI utilities utilizing this functionality (`amiudbg.inf` & `amiudbg.sys`).

Before installing this driver, check the following:

- Close any terminal sessions used to access AMIDebug Rx via USB VCOM (Ayera TeraTerm Pro, Microsoft Hyperterminal or similar program). The driver will fail to install if any terminal programs are open and trying to access the AMIDebug Rx device.
- Change the OPTION SWITCH on AMIDebug Rx from CHECKPOINT to DEBUG

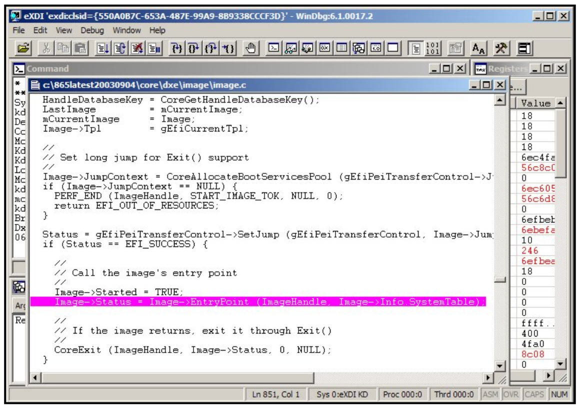
Ayera TeraTerm Does Not Recognize Ports above COM4

The USB VCOM port produced by AMIDebug Rx may be mapped to a high COM port address (example: COM5, COM10). The Ayera TeraTerm program will only work with COM1-4 by default. The TeraTerm configuration file can be modified to resolve this problem.

- Close the TeraTerm application
- Locate the file teraterm.ini in the TeraTerm program folder (`tterm`)
- Open `teraterm.ini` in a text editor
- Locate the entry for `MaxComPort`
- Change MaxComPort to a higher value (example: `MaxComPort=16`)
- Save the file `teraterm.ini` and exit the text editor
- Restart the TeraTerm application. COM ports above COM4 should now be accessible.

AMIDebug Products for Source-Code Development

AMIDebug software solutions are powerful tools for debugging AMIBIOS8 & Aptio 4.x BIOS projects, offering source-level debugging without the need for an expensive in-circuit emulator (ICE) or in-target probe (ITP) hardware solution. Developers have access to source-level debugging and control the debug target hardware through a GUI application for Microsoft Windows.


eXDI 'exdi:clsid={550A0B7C-653A-487E-99A9-8B9338CCCF3D}' - WinDbg:6.1.0017.2
File Edit View Debug Window Help
Command
Registers
c:\865latest20030904\core\dxe\image\image.c
Ln 851, Col 1
Sys 0:eXDI KD
Proc 000:0
Thrd 000:0
ASM OVR CAPS NUM

```
HandleDatabaseKey = CoreGetHandleDatabaseKey();
LastImage         = mCurrentImage;
mCurrentImage     = Image;
Image->Tpl        = gEfiCurrentTpl;

//
// Set long jump for Exit() support
//
Image->JumpContext = CoreAllocateBootServicesPool (gEfiPeiTransferControl->J
if (Image->JumpContext == NULL) {
  PERF_END (ImageHandle, START_IMAGE_TOK, NULL, 0);
  return EFI_OUT_OF_RESOURCES;
}

Status = gEfiPeiTransferControl->SetJump (gEfiPeiTransferControl, Image->Jum
if (Status == EFI_SUCCESS) {

  //
  // Call the image's entry point
  //
  Image->Started = TRUE;
  Image->Status = Image->EntryPoint (ImageHandle, Image->Info.SystemTable);

  //
  // If the image returns, exit it through Exit()
  //
  CoreExit (ImageHandle, Image->Status, 0, NULL);
}
```

```
Value
18
18
18
18
6ec4fa
56c8c0
0
6ec605
56c6d8
0
6efbeb
6ebefa
10
246
6efbea
18
0
0
0
0
ffff..
400
4fa0
8c08
0
```

AMIDebug for AMIBIOS8 provides functionality similar to hardware-based development tools, including, source-level symbolic debugging and access to hardware resources (CPU registers, PCI config space, memory and I/O locations).

AMIDebug for UEFI offers the same debugging capabilities for Aptio 4.x firmware, as well as debugging UEFI drivers and pre-boot applications running in the EFI Shell.

For more information on AMI Debug software products, contact an AMI Software Sales Associate.

USB Debug Mode

AMIDebug Rx functions as a generic USB debug descriptor device when the OPTION SWITCH is set to debug mode (LEFT). This function allows host-to-host communication for various debug applications.

```
USB Host-to-Host
  Running ...
```

Note that checkpoint display is disabled in this mode.

AMI Debug Unlock Code

The AMIDebug Rx product can be used as a “debug transport” to connect a system under test with debug host software (AMIDebug for UEFI and AMIDebug for AMIBIOS8). This feature is disabled by default but can be unlocked by customers licensing AMIDebug software from AMI. More information on using AMIDebug Rx is included in the AMIDebug user manual.

An AMI software sales associate will provide an unlock code based on the unit serial number. The serial number can be found using the `info` terminal command.

```
info

AMIDebug Rx
(C)Copyright 2017, American Megatrends, Inc.

Serial number    : 9800000001
Hardware version: 980F
Firmware version: 3.4.1
```

This is an eight character hexadecimal string that is entered by the user in the VCOM terminal.

```
unlock 00000000
```

If an invalid code is entered, the following message will appear:

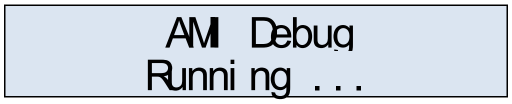
```
Invalid code
```

A valid unlock code will generate the following message:

```
Unlocked!
Please reset your device for these changes to take effect
```

Reset the device by removing all USB cables and then attach the USB cable to power on the device.

After unlock the following screen is displayed when the OPTION SWITCH is set to debug mode (LEFT):



```
AMI Debug
Running . . .
```

The "AMI Debug" mode has the same functions as the "USB Host-to-Host" mode, adding support for AMIDebug software products.

After unlocking the device, it may be necessary to install the USB drivers included with the AMI Debug software distribution licensed from AMI to access VCOM functionality.

Windows Kernel Debugging

AMI Debug Rx can be used as a generic USB debug transport for Windows Kernel Debugging.

Requirements for using Debug Rx as USB transport for Kernel Debugging:

- Target platform with USB 2.0 Debug Port, running Microsoft Windows Vista or higher
- Host running Debugging Tools for Windows (WINDBG) on Microsoft Windows XP or higher
- AMIDebug Rx device using firmware version 2.3.4 or higher

BCDedit should be used to configure the bootloader on the target to place Windows in debug mode, set the PCI Bus/Device/Function number for the EHCI controller, and specify the target name that the kernel debugger will use to connect. The following is an example usage:

```
C:\>bcdedit -debug on
C:\>bcdedit -set {current} loadoptions busparams=0.29.7
C:\>bcdedit /dbgsettings USB TARGETNAME:usb
```

Set the OPTION SWITCH to debug mode (LEFT) and connect the host and target to the AMIDebug Rx via the USB debug port. WINDBG must then be started on the host, with the correct "usb targetname" specified. The target system can then be started, allowing the WINDBG host to connect.

- *The debug host must use the USB 2.0 Debug Connection Device driver supplied with WINDBG, not the PLX debug driver supplied with AMIDebug Rx.*
- *PCI bus/device/function numbers are in hexadecimal format for Microsoft Windows Vista, but are in decimal format for Microsoft Windows 7. Please be aware of this when using bcdedit.*

Terminal Output Examples

Example String Table (using Download/Display Command)

```
00      AMIDEBUG RX/APTIO
01      PWR ON, RST DETECT
02      AP INIT B/F MICRO
03      NB INIT B/F MICRO
04      SB INIT B/F MICRO
05      OEM INIT B/F MICRO
06      MICROCODE LOADING
07      AP INIT A/F MICRO
08      NB INIT A/F MICRO
09      SB INIT A/F MICRO
0A      OEM INIT A/F MICRO
0B      CACHE INIT
0C      AMI RESERVED
0D      AMI RESERVED
0E      MICROCODE NOT FOUND
0F      MICROCODE NOT LOADED
10      PEI CORE STARTED
11      PRE-MEM CPU INIT
12      CPU PRE-MEM INIT
13      CPU PRE-MEM INIT
14      CPU PRE-MEM INIT
15      PRE-MEM NB INIT
16      PRE-MEM NB INIT
17      PRE-MEM NB INIT
18      PRE-MEM NB INIT
19      PRE-MEM SB INIT
1A      PRE-MEM SB INIT
1B      PRE-MEM SB INIT
1C      PRE-MEM SB INIT
1D      OEM PRE-MEM INIT
1E      OEM PRE-MEM INIT
1F      OEM PRE-MEM INIT
2A      OEM PRE-MEM INIT
2B      MEM INIT. SPD READ
2C      MEM INIT. MEM DETECT
2D      PROG MEM TIMING INFO
2E      CONFIGURING MEMORY
2F      MEM INITIALIZATION
30      ASL RESERVED
31      MEMORY INSTALLED
32      CPU POST-MEM INIT
33      CACHE INITIALIZATION
34      APP PROCESSOR INIT
35      BSP SELECTION
36      SMM INITIALIZATION
37      POST-MEM NB INIT
38      POST-MEM NB INIT
39      POST-MEM NB INIT
3A      POST-MEM NB INIT
3B      POST-MEM SB INIT
3C      POST-MEM SB INIT
3D      POST-MEM SB INIT
3E      POST-MEM SB INIT
3F      OEM POST-MEM INIT
```

40	OEM POST-MEM INIT
41	OEM POST-MEM INIT
42	OEM POST-MEM INIT
43	OEM POST-MEM INIT
44	OEM POST-MEM INIT
45	OEM POST-MEM INIT
46	OEM POST-MEM INIT
47	OEM POST-MEM INIT
48	OEM POST-MEM INIT
49	OEM POST-MEM INIT
4A	OEM POST-MEM INIT
4B	OEM POST-MEM INIT
4C	OEM POST-MEM INIT
4D	OEM POST-MEM INIT
4E	OEM POST-MEM INIT
4F	DXE IPL IS STARTED
50	INV MEM TYPE/SPEED
51	SPD READING FAILED
52	INV MEM SIZE/MODULES
53	NO USABLE MEM DETECT
54	MEM INIT ERROR
55	MEMORY NOT INSTALLED
56	INV CPU TYPE/SPEED
57	CPU MISMATCH
58	CPU SELF TEST FAILED
59	CPU MICRO NOT FOUND
5A	INTERNAL CPU ERROR
5B	RESET PPI NOT AVAIL
5C	AMI RESERVED
5D	AMI RESERVED
5E	AMI RESERVED
5F	AMI RESERVED
60	DXE CORE STARTED
61	NVRAM INITIALIZATION
62	INSTALL SB RUNTIME
63	CPU DXE INIT
64	CPU DXE INIT
65	CPU DXE INIT
66	CPU DXE INIT
67	CPU DXE INIT
68	PCI HB INIT
69	NB DXE INIT
6A	NB DXE SMM INIT
6B	NB DXE INIT
6C	NB DXE INIT
6D	NB DXE INIT
6E	NB DXE INIT
6F	NB DXE INIT
70	SB DXE INIT
71	SB DXE SMM INIT
72	SB DEVICES INIT
73	SB DXE INIT
74	SB DXE INIT
75	SB DXE INIT
76	SB DXE INIT
77	SB DXE INIT
78	ACPI MODULE INIT
79	CSM INIT
7A	RESERVED AMI DXE
7B	RESERVED AMI DXE
7C	RESERVED AMI DXE
7D	RESERVED AMI DXE
7E	RESERVED AMI DXE
7F	RESERVED AMI DXE
80	OEM DXE INIT
81	OEM DXE INIT

82	OEM DXE INIT
83	OEM DXE INIT
84	OEM DXE INIT
85	OEM DXE INIT
86	OEM DXE INIT
87	OEM DXE INIT
88	OEM DXE INIT
89	OEM DXE INIT
8A	OEM DXE INIT
8B	OEM DXE INIT
8C	OEM DXE INIT
8D	OEM DXE INIT
8E	OEM DXE INIT
8F	OEM DXE INIT
90	BDS STARTED
91	DRIVER CONNECTING
92	PCI BUS INIT
93	PCI BUS HOT PLUG
94	PCI BUS ENUMERATION
95	PCI BUS REQUEST
96	PCI BUS ASSIGN
97	CONSOLE OUTPUT CON
98	CONSOLE INPUT CON
99	SUPER IO INIT
9A	USB INIT
9B	USB RESET
9C	USB DETECT
9D	USB ENABLE
9E	AMI RESERVED
9F	AMI RESERVED
A0	ASL RESERVED
A1	IDE INIT
A2	IDE RESET
A3	IDE DETECT
A4	IDE ENABLE
A5	SCSI INIT
A6	SCSI RESET
A7	SCSI DETECT
A8	SCSI ENABLE
A9	SETUP VERIFY PASS
AA	ASL RESERVED
AB	START OF SETUP
AC	SETUP INPUT WAIT
AD	READY TO BOOT EVENT
AE	LEGACY BOOT EVENT
AF	EXIT BOOT SERVICES
B0	VIRTUAL ADDR MAP BEG
B1	VIRTUAL ADDR MAP END
B2	LGCY OPTION ROM INIT
B3	SYSTEM RESET
B4	USB HOT PLUG
B5	PCI BUS HOT PLUG
B6	CLEAN-UP OF NVRAM
B7	CONFIGURATION RESET
B8	AMI RESERVED
B9	AMI RESERVED
BA	AMI RESERVED
BB	AMI RESERVED
BC	AMI RESERVED
BD	AMI RESERVED
BE	AMI RESERVED
BF	AMI RESERVED
C0	OEM BDS INIT
C1	OEM BDS INIT
C2	OEM BDS INIT
C3	OEM BDS INIT

```
C4      OEM BDS INIT
C5      OEM BDS INIT
C6      OEM BDS INIT
C7      OEM BDS INIT
C8      OEM BDS INIT
C9      OEM BDS INIT
CA      OEM BDS INIT
CB      OEM BDS INIT
CC      OEM BDS INIT
CD      OEM BDS INIT
CE      OEM BDS INIT
CF      OEM BDS INIT
D0      CPU INIT ERROR
D1      NB INIT ERROR
D2      SB INIT ERROR
D3      PROTOCOL NOT AVAIL.
D4      PCI ALLOC ERROR
D5      NO SPACE FOR OPROM
D6      NO CONOUT DEVICE
D7      NO CONIN DEVICE
D8      INVALID PASSWORD
D9      ERROR LOADING BOOT
DA      BOOT OPTION FAILED
DB      FLASH UPDATE FAILED
DC      RESET PROTOCOL FAIL
E0      S3 RESUME STARTED
E1      S3 BOOT SCRIPT EXEC
E2      VIDEO REPOST
E3      OS S3 WAKE VECTOR
E4      AMI RESERVED
E5      AMI RESERVED
E6      AMI RESERVED
E7      AMI RESERVED
E8      S3 RESUME PEI FAIL
E9      S3 PPI NOT FOUND
EA      S3 BOOT SCRIPT ERROR
EB      S3 OS WAKE ERROR
EC      AMI RESERVED
ED      AMI RESERVED
EE      AMI RESERVED
EF      AMI RESERVED
F0      RECOVERY - FIRMWARE
F1      RECOVERY - USER
F2      RECOVERY STARTED
F3      RECOVERY FW STARTED
F4      RECOVERY FW LOADED
F5      AMI RESERVED
F6      AMI RESERVED
F7      AMI RESERVED
F8      RECOVERY PPI NOT FND
F9      RECOVERY CAP NOT FND
FA      INVALID RECOVERY CAP
FB      AMI RESERVED
FC      AMI RESERVED
FD      AMI RESERVED
FE      AMI RESERVED
FF      AMI RESERVED
```

Example Session Output (using Download/Display Command)

```
                        AMI Debug Rx Output for Session#1
===============================================================================

Session Start Time      :       06/10/2009 15:16:44
Total Checkpoints       :       52
```

```
Duration of last boot  :      23,703ms
BIOS Tag               :      0ABFL032
BIOS Type              :      Aptio 4.x
BIOS Build Time        :      05/11/2009 17:00:07

                              Checkpoint Output
-------------------------------------------------------------------------------
 Num             CP               Time (ms)                String
-----          ------          --------------          --------------------
    1          0x0011                 1,372ms           PRE-MEM CPU INIT
    2          0x0015                 1,513ms           PRE-MEM NB INIT
    3          0x0019                 1,883ms           PRE-MEM SB INIT
    4          0x002B                 8,674ms           MEM INIT. SPD READ
    5          0x002C                 9,172ms           MEM INIT. MEM DETECT
    6          0x002E                 9,262ms           CONFIGURING MEMORY
    7          0x0031                 9,942ms           MEMORY INSTALLED
    8          0x0032                12,067ms           CPU POST-MEM INIT
    9          0x0033                12,075ms           CACHE INITIALIZATION
   10          0x0059                12,154ms           CPU MICRO NOT FOUND
   11          0x0034                12,162ms           APP PROCESSOR INIT
   12          0x0036                12,463ms           SMM INITIALIZATION
   13          0x004F                12,585ms           DXE IPL IS STARTED
   14          0x0061                16,738ms           NVRAM INITIALIZATION
   15          0x0062                16,760ms           INSTALL SB RUNTIME
   16          0x0063                16,763ms           CPU DXE INIT
   17          0x0068                16,782ms           PCI HB INIT
   18          0x0069                16,785ms           NB DXE INIT
   19          0x006A                16,814ms           NB DXE SMM INIT
   20          0x0070                16,831ms           SB DXE INIT
   21          0x0071                16,876ms           SB DXE SMM INIT
   22          0x0072                16,877ms           SB DEVICES INIT
   23          0x0078                16,993ms           ACPI MODULE INIT
   24          0x0079                17,014ms           CSM INIT
   25          0x009A                17,043ms           USB INIT
   26          0x0090                17,063ms           BDS STARTED
   27          0x0091                17,094ms           DRIVER CONNECTING
   28          0x0092                17,096ms           PCI BUS INIT
   29          0x0094                17,097ms           PCI BUS ENUMERATION
   30          0x0094                17,097ms           PCI BUS ENUMERATION
   31          0x0094                17,097ms           PCI BUS ENUMERATION
   32          0x0094                17,098ms           PCI BUS ENUMERATION
   33          0x0095                17,098ms           PCI BUS REQUEST
   34          0x0096                17,099ms           PCI BUS ASSIGN
   35          0x0097                17,400ms           CONSOLE OUTPUT CON
   36          0x00B2                17,401ms           LGCY OPTION ROM INIT
   37          0x0099                17,744ms           SUPER IO INIT
   38          0x0098                17,818ms           CONSOLE INPUT CON
   39          0x0099                17,820ms           SUPER IO INIT
   40          0x0092                19,840ms           PCI BUS INIT
   41          0x009C                19,875ms           USB DETECT
   42          0x00B4                19,900ms           USB HOT PLUG
   43          0x00B4                21,111ms           USB HOT PLUG
   44          0x0099                21,160ms           SUPER IO INIT
   45          0x00A0                21,666ms           ASL RESERVED
   46          0x00A2                21,667ms           IDE RESET
   47          0x00A3                21,667ms           IDE DETECT
   48          0x00A0                21,674ms           ASL RESERVED
   49          0x00A2                21,674ms           IDE RESET
   50          0x00A3                21,675ms           IDE DETECT
   51          0x00AD                23,705ms           READY TO BOOT EVENT
   52          0x00AE                23,705ms           LEGACY BOOT EVENT


                             Debug String Output
-------------------------------------------------------------------------------
```

```
[AmiDbg]Register PPI Notify: 36164812-a023-44e5-bd85-05bf3c7700aa
[AmiDbg]Notify: PPI Guid: 36164812-a023-44e5-bd85-05bf3c7700aa, Peim notify entry point:
fffe7810
[AmiDbg]PeiDebugSupport.Entry(FFFBD42C)
[AmiDbg]Register PPI Notify: f894643d-c449-42d1-8ea8-85bdd8c65bde
[AmiDbg]Register PPI Notify: 605ea650-c65c-42e1-ba80-91a52ab618c6
[AmiDbg]CpuPeiBeforeMem.Entry(FFFECB85)
[AmiDbg]NBPEI.Entry(FFFF495B)
[AmiDbg]SBPEI.Entry(FFFF1AED)
[AmiDbg]>>> PM Registers Before GPIO Init <<<
[AmiDbg]+===================== PM Registers dump =====================+
[AmiDbg]  PM1a_EVT_BLK.PM1_STS        : Addr = 0400 => Val = 0001
[AmiDbg]  PM1a_EVT_BLK.PM1_EN         : Addr = 0402 => Val = 0000
[AmiDbg]  PM1a_CNT_BLK.PM1_CNT        : Addr = 0404 => Val = 00001C00
[AmiDbg]  PMTMR_BLK.PM1_TMR           : Addr = 0408 => Val = xx9E5F20
[AmiDbg]  P_BLK.PROC_CNT              : Addr = 0410 => Val = 00000000
[AmiDbg]  GPE0_BLK.GPEO_STS           : Addr = 0428 => Val = BDFF0000
[AmiDbg]  GPE0_BLK.GPEO_EN            : Addr = 042C => Val = 00000000
[AmiDbg]+==================== SMI Registers dump ====================+
[AmiDbg]  SMI_EN                      : Addr = 0430 => Val = 00000000
[AmiDbg]  SMI_STS                     : Addr = 0434 => Val = 00000100
[AmiDbg]  ALT_GP_SMI_EN               : Addr = 0438 => Val = 0000
[AmiDbg]  ALT_GP_SMI_STS              : Addr = 043A => Val = BDFF
[AmiDbg]+================== MISC ICH7 PM Registers ===================+
[AmiDbg]  GPE_CNTL                    : Addr = 0442 => Val = 00
[AmiDbg]  DEVACT_STS                  : Addr = 0444 => Val = 0020
[AmiDbg]  SS_CNT                      : Addr = 0450 => Val = 00
[AmiDbg]  C3_RES                      : Addr = 0454 => Val = 00000000
[AmiDbg]+==================== TCO Registers dump ====================+
[AmiDbg]  TCO_RLD                     : Addr = 0460 => Val = 0004
[AmiDbg]  TCO_DAT_IN                  : Addr = 0462 => Val = 00
[AmiDbg]  TCO_DAT_OUT                 : Addr = 0463 => Val = 00
[AmiDbg]  TCO1_STS                    : Addr = 0464 => Val = 0000
[AmiDbg]  TCO2_STS                    : Addr = 0466 => Val = 0000
[AmiDbg]  TCO1_CNT                    : Addr = 0468 => Val = 0800
[AmiDbg]  TCO2_CNT                    : Addr = 046A => Val = 0008
[AmiDbg]  TCO_MESSAGE1                : Addr = 046C => Val = 00
[AmiDbg]  TCO_MESSAGE2                : Addr = 046D => Val = 00
[AmiDbg]  TCO_WDCNT                   : Addr = 046E => Val = 00
[AmiDbg]  SW_IRQ_GEN                  : Addr = 0470 => Val = 03
[AmiDbg]  TCO_MESSAGE2                : Addr = 0472 => Val = 0004
[AmiDbg]+==========================================================+
[AmiDbg]>>> PM Registers After GPIO Init <<<
[AmiDbg]+===================== PM Registers dump =====================+
[AmiDbg]  PM1a_EVT_BLK.PM1_STS        : Addr = 0400 => Val = 0001
[AmiDbg]  PM1a_EVT_BLK.PM1_EN         : Addr = 0402 => Val = 0000
[AmiDbg]  PM1a_CNT_BLK.PM1_CNT        : Addr = 0404 => Val = 00001C00
[AmiDbg]  PMTMR_BLK.PM1_TMR           : Addr = 0408 => Val = xx5AB313
[AmiDbg]  P_BLK.PROC_CNT              : Addr = 0410 => Val = 00000000
[AmiDbg]  GPE0_BLK.GPEO_STS           : Addr = 0428 => Val = BDFF0000
[AmiDbg]  GPE0_BLK.GPEO_EN            : Addr = 042C => Val = 00000000
[AmiDbg]+==================== SMI Registers dump ====================+
[AmiDbg]  SMI_EN                      : Addr = 0430 => Val = 00000000
[AmiDbg]  SMI_STS                     : Addr = 0434 => Val = 00000100
[AmiDbg]  ALT_GP_SMI_EN               : Addr = 0438 => Val = 0000
[AmiDbg]  ALT_GP_SMI_STS              : Addr = 043A => Val = BDFF
[AmiDbg]+================== MISC ICH7 PM Registers ===================+
[AmiDbg]  GPE_CNTL                    : Addr = 0442 => Val = 00
[AmiDbg]  DEVACT_STS                  : Addr = 0444 => Val = 0020
[AmiDbg]  SS_CNT                      : Addr = 0450 => Val = 00
[AmiDbg]  C3_RES                      : Addr = 0454 => Val = 00000000
[AmiDbg]+==================== TCO Registers dump ====================+
[AmiDbg]  TCO_RLD                     : Addr = 0460 => Val = 0004
[AmiDbg]  TCO_DAT_IN                  : Addr = 0462 => Val = 00
[AmiDbg]  TCO_DAT_OUT                 : Addr = 0463 => Val = 00
[AmiDbg]  TCO1_STS                    : Addr = 0464 => Val = 0000
```

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[AmiDbg]  TCO2_STS                      : Addr = 0466 => Val = 0000
[AmiDbg]  TCO1_CNT                      : Addr = 0468 => Val = 0800
[AmiDbg]  TCO2_CNT                      : Addr = 046A => Val = 0008
[AmiDbg]  TCO_MESSAGE1                  : Addr = 046C => Val = 00
[AmiDbg]  TCO_MESSAGE2                  : Addr = 046D => Val = 00
[AmiDbg]  TCO_WDCNT                     : Addr = 046E => Val = 00
[AmiDbg]  SW_IRQ_GEN                    : Addr = 0470 => Val = 03
[AmiDbg]  TCO_MESSAGE2                  : Addr = 0472 => Val = 0004
[AmiDbg]+==============================================================+
[AmiDbg]MemDetect.Entry(FFFF6582)
[AmiDbg]Memory Installed: Address=1C700000; Length=3000000
[AmiDbg]PEI_STACK: Address=1C700000; Length=100000
[AmiDbg]HOBLIST address before memory init = 0xfef00400
[AmiDbg]HOBLIST address after memory init = 0x1c800000
[AmiDbg]PEI core reallocated to memory
[AmiDbg]Total Cache as RAM:    7168 bytes.
[AmiDbg]  CAR stack ever used: 3580 bytes.
[AmiDbg]  CAR heap used:       3016 bytes.
[AmiDbg]Notify: PPI Guid: f894643d-c449-42d1-8ea8-85bdd8c65bde, Peim notify entry point:
fffbda9f
[AmiDbg]Notify: PPI Guid: 36164812-a023-44e5-bd85-05bf3c7700aa, Peim notify entry point:
fffe7810
[AmiDbg]Capsule.Entry(1F6F0A5E)
[AmiDbg]Capsule Read variable service installed
[AmiDbg]EFI_NOT_FOUND
[AmiDbg]S3Resume.Entry(FFF78DAD)
[AmiDbg]CpuPei.Entry(FFFEE19D)
[AmiDbg]NumCpus = 2.
[AmiDbg]Register PPI Notify: 605ea650-c65c-42e1-ba80-91a52ab618c6
[AmiDbg]PEIM 8401a046-6f70-4505-8471-7015b40355e3 was not started!!
[AmiDbg]PEIM e008b434-0e73-440c-8612-a143f6a07bcb was not started!!
[AmiDbg]PEIM 32505be8-6469-4f79-9b01-66b3f9617e7d was not started!!
[AmiDbg]PEIM a47438d5-94e9-49b3-bc31-7e6bc9363814 was not started!!
[AmiDbg]DXE IPL Entry
[AmiDbg]CORE_DXE.Entry(1F579DE4)
[AmiDbg]Notify: PPI Guid: 605ea650-c65c-42e1-ba80-91a52ab618c6, Peim notify entry point:
fffbe35b
[AmiDbg][13AC6DD0-73D0-11D4-B06B-00AA00BD6DE7].Entry(11F46A0)
[AmiDbg]Runtime.Entry(1F55C520)
[AmiDbg]ReFlash.Entry(11F081C)
[AmiDbg]SBRun.Entry(1F546A5C)
[AmiDbg]ACPIS3Save.Entry(121D680)
[AmiDbg]CpuDxe.Entry(1236180)
[AmiDbg]AcpiResLib: LibGetDsdt(): LocateProtocol(ACPISupport) returned EFI_NOT_FOUND
[AmiDbg]PciRootBridge.Entry(125FC7C)
[AmiDbg]PciHostCSHooks: LocateProtocol(ACPISupport)=EFI_NOT_FOUND
[AmiDbg]CspLibDxe.Entry(1221220)
...
```

Example session is for an Aptio 4.x BIOS with UEFI debug strings enabled. Some debug strings were removed to make the example output shorter. The debug strings will typically not be present on a production BIOS.

Limited Hardware Warranty

This Limited Warranty is extended by AMI only to the original purchaser of the accompanying AMI microcomputer hardware product (the "Product") and is not assignable to any other person.

AMI offers a one (1) year warranty on all hardware products, excluding battery packs and keyboard controllers unless otherwise documented in a legal contract with the customer or warranty card accompanying the product. AMI warrants that the Product will be free from defects in materials and workmanship, under normal use and service and will perform substantially in accordance with the description of the Product in the AMI User's Guide for this product. Warranty will be void if serial number labels on the AMI hardware are tampered with.

ALL WARRANTIES ARE SUBJECT TO THE TERMS AND CONDITIONS ON THE AMI WARRANTY REGISTRATION CARD.

You are solely responsible for any failure of the Product which results from accident, abuse, misapplication or alteration of the Product and AMI assumes no liability as a consequence of such events under the terms of this Limited Warranty. While AMI has made every effort to provide clear and accurate technical information about the application of the Product, AMI assumes no liability for any events arising out of the use of this technical information.

The sole and exclusive remedy for failure of the Product to conform to this Limited Warranty shall be for AMI, at its option, to repair or replace the Product, to whatever extent deems necessary to restore the Product to proper operating condition. AMI may make replacements hereunder with new or functionally equivalent products of equal value.

To obtain warranty service, you must first call AMI technical support at 770-246-8645. If tech support cannot resolve the problem you are encountering, you will be directed to submit a return materials authorization form. You must complete the form in its entirety. This form can be found on our website: ami.com under RMA Procedures or the form can be faxed to you. Upon receipt of the RMA request form, an RMA number will be processed and issued to you. Please allow at least 24 hours for a response. An RMA number will be communicated to you via email or phone call with notification of the status of your board, i.e. warranty or non-warranty.

Remember, non-warranty boards will incur a minimum charge of $100.00 plus parts and shipping. Please retain a copy of your notification for your files and future references. Upon receipt of the RMA number, return the Product, together with (a) the return authorization number, (b) proof and date of purchase, (C) a description of the problem with the Product and (d) your name and mailing address, postage prepaid to: AMI, 5555 Oakbrook Parkway, Building 200, Norcross, Georgia 30093 (USA). Mark the outside of your box with the RMA number. Failure to do so will delay receiving and processing your Product.

AMI requires that the Product be packed in an anti-static material and packaged adequately for shipping and be insured when shipped. AMI shall not be responsible for damage to the Product in transit. The product will be returned to you by method and carrier chosen by AMI to any destination within the United States of America. If you desire some other specific form of conveyance or shipment beyond the USA border or if the product is out of warranty, you must bear the cost of return shipment.

Please note that if you return the Product without proof of purchase or after expiration of the applicable period of coverage for this Limited Warranty, AMI will, at its option, repair or replace the Product and charge you the then effective AMI recommended Retail Price for the repair or replacement of the Product. Any such repair or replacement of out of warranty products is contingent upon the commercial availability of the required components. If AMI has discontinued the manufacture or redistribution of such Product because of technical obsolescence the product shall be held for no longer than thirty (30) days awaiting your instructions.

If Product is out of warranty, you will be contacted for billing information. Charges are based on a $100.00 minimum fee, plus parts and shipping. Should the repair costs exceed $200.00, you will be notified for prior approval before repairs are complete. Average cost of repair is $150.00. For non-warranty or out-of-warranty repairs, AMI will accept: company purchase orders, credit cards (American Express, VISA, Mastercard, & Discover) and cashier's checks.

Please allow at least ten (10) days before inquiring about the status of your product. Upon receipt, please inspect and test your products. There is a thirty (30) day warranty on all repairs.

For additional information or question regarding our policies and procedures please call (770) 246-8621.