congatec System Utility

Installation and usage of the congatec System Utility

User's Guide

Revision 1.5

Revision History

Revision	Date (yyyy.mm.dd)	Author	Changes
0.1	2006.01.30	GWE	• Official release
1.1	2006.02.02	GWE	• Changed installation description 2.1
1.2	2006.12.14	GWE	• Updated for version 1.3.x of the congatec System Utility
1.3	2007.06.29	GWE	• Updated for version 1.3.2 of the congatec System Utility
1.4	2009.05.29	GWE	• Updated for version 1.4.0 of the congatec System Utility
1.5	2017.07.19	GWE	• Major rework and refresh based on update for version 1.5.6 of the congatec System Utility

Preface

This user's guide provides information about the installation and usage of the congatec System Utility.

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Warning

Warnings indicate conditions that, if not observed, can cause personal injury.

Caution

Cautions warn the user about how to prevent damage to hardware or loss of data.

Note

Notes call attention to important information that should be observed.

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Terminology

Term	Description
GUI	Graphical user interface
CGBC	congatec board controller
EPI	Embedded panel interface
EPI EEPROM	External EEPROM connected to the dedicated EPI I2C bus
COM	Computer on module
CGOS API	congatec operating system programming interface
POST	BIOS power on self test
N.A.	Not available
T.B.D.	To be determined

Contents

1 Introduction

The congatec System Utility provides a common tool for all congatec COM (Computer on Module) and SBC (Single Board Computer) products.

The utility consists of six modules:

BIOS Update Module	Offers functions to update the system BIOS of a congatec board.
Firmware Update Module	Offers functions to update the firmware of the congatec board controller.
Panel Configuration Module	Offers functions to support or ease local flat panel configuration.
BIOS Module Modification Module	Offers functions to customize a standard congatec system BIOS by adding OEM defined BIOS modules such as boot logos, BIOS setup default or settings modules and OEM code or data modules.
BIOS/Board Information Module	Offers functions to easily gather congatec specific BIOS and hardware information.
BIOS Setup Configuration Module	Offers functions to modify the standard BIOS setup menu (only supported for recent AMI AptioV based products).

The utility supports two different operating modes:

Board mode	The utility must be executed on a congatec target system. Using the congatec operating system API and driver set (CGOS API), that is common for all congatec boards, the utility is able to directly access the underlying hardware. Functions that perform BIOS modifications will directly access and modify the contents of the onboard BIOS Flash Memory chip.
BIOS File mode	All operations are performed on a BIOS file only, which in turn can be flashed onto the respective target boards later on. In this mode, the congatec System Utility can also be executed on a standard host PC. However, functionality is limited to BIOS module modifications and those parts of the panel configuration functions that also modify the BIOS.

Caution

It is possible to corrupt the BIOS by modifying it with the congatec System Utility. Use a congatec evaluation baseboard to test the desired modifications. Ensure you have a copy of the original system BIOS stored in the external Flash Memory chip (located on the baseboard). In case the onboard BIOS is corrupted, the BIOS in the external flash can be used to boot the board and write back the original BIOS to the onboard Flash Memory chip. Please contact the congatec support team to get a copy of the respective BIOS file to store it into the Flash Memory chip on your baseboard.

Related Documentation

This user's guide is one of several documents that should be read to fully understand and make best use of the features offered by the congatec System Utility. At the time this user's guide was written, several related congatec application note documents were available and should be referred to as well.

The links to these documents can be found in the support section of the congatec AG website at www.congatec.com. congatec recommends that you check the website regularly for updates to these documents as well as additional documentation that may pertain to the congatec System Utility.

2 Installation

The congatec System Utility package is available on the congatec website at www.congatec.com. The package includes the following utility versions in a single ZIP file:

- Windows command line and GUI
- DOS command line
- UEFI Shell

The Linux command line version is available as a separate, open source package.

Note

The Windows and Linux versions require the CGOS driver set, which can be found in the driver section of each product on the congatec website.

2.1 Windows Command Line and GUI Version

The folder CGUTIL\WIN32 of the utility package contains the Windows command line (CGUTLCMD.EXE) and GUI version (CGUTLGUI.EXE) of the congatec System Utility. The executables may be placed in any directory. However, both versions need additional files from the CGOS driver package.

In order to use the utility in 'BIOS File' mode (modification of congatec BIOS file only) on a host or target system, extract the Windows version of the file CGOS.DLL from the CGOS driver package. Copy this file into the same directory as the utility executable or into the WINDOWS\SYSTEM32 folder. Installation is not required.

In order to use the utility in 'Board' mode (direct target system modification) on a congatec board, install the complete CGOS driver package on the system. Ensure that you have 'Administrative Rights' on the system and follow the installation instructions in the CGOS driver package.

2.2 DOS Command Line Version

The file CGUTLCMD.EXE in the CGUTIL\DOSX folder of the ZIP package is the DOS command line version of the congatec System Utility. This version does not require additional files or installation.

Note

The DOS version of the utility can only be run on a real DOS system. Windows command window execution is not supported.

2.3 Linux Command Line Version

In order to build the Linux command line version of the congatec System Utility (cgutlcmd), run 'make' in the folder cgutillx/cgutlcmd. Installation is not required. It may be placed in any directory. However, additional files from the CGOS driver package for Linux are required.

In order to use the utility in 'BIOS File' mode (modification of congatec BIOS file only) on a host or target system, extract the Linux version of the CGOS interface library (libcgos.so) from the CGOS driver package. Copy this file into the same directory as the utility executable or into the standard system library directory. Installation is not required.

In order to use the utility in 'Board' mode (direct target system modification) on a congatec board, install the CGOS interface library and kernel driver on the system. For detailed information about CGOS driver setup on a Linux system, refer to the documentation included in the respective CGOS driver package.

2.4 UEFI Shell Version

The UEFI Shell version of the congatec System Utility is located in the folder cgutil/uefi/X64 of the package. In order to use cgutlcmd from the UEFI Shell, copy the file cgutlcmd.efi to an UEFI Shell accessible medium. Installation and additional files are not required.

3 Usage

This section provides a detailed description of the functions offered by the congatec System Utility.

Because the command line versions and the Windows GUI version basically offer the same functionality, this description is structured by function modules with subsections for command line and GUI versions. Additionally, given that the available DOS, Linux, Windows and UEFI Shell command line versions of the congatec System Utility share the same syntax, they are commonly referred to as command line versions of the utility.

The individual module sections may also include a short overview of the related congatec BIOS features. A detailed description of the congatec BIOS features is beyond the scope of this document. Refer to further congatec documentation or contact the congatec technical support team for detailed information if required.

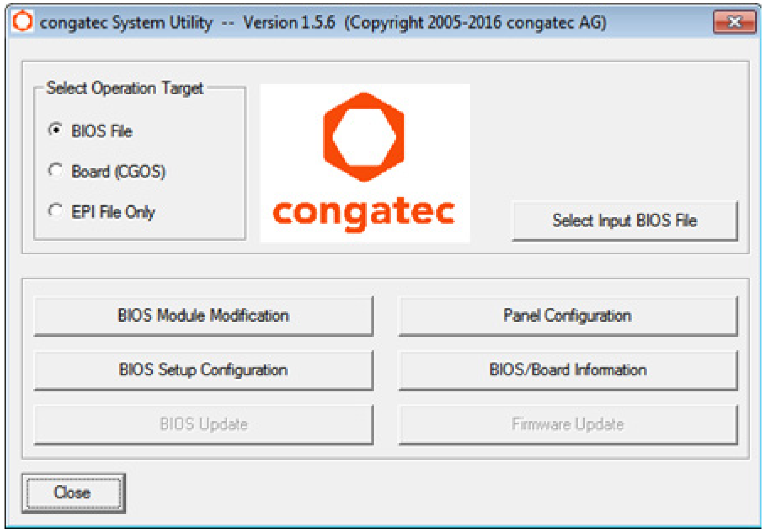
The congatec System Utility supports two main operating modes and consists of several function modules. Certain sub-functions or whole function modules are only available in 'Board' mode on a target system because they require a real system to operate on. They will not be available in 'BIOS File' mode.

In addition to the two main operating modes that are supported by both the GUI and the command line applications, the GUI version also supports the special 'EPI File Only' mode option. In this mode, neither a congatec target board nor a congatec BIOS file is required. Functionality of the tool is limited to generating and modifying EPI panel data set files.

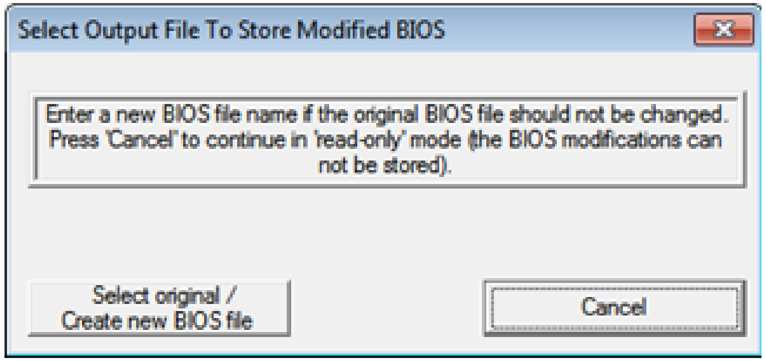
When using the Windows GUI version (CGUTLGUI), the main window allows you to select the desired operating target and provides access to the single function modules. Functions not available in 'BIOS File' or 'EPI File Only' mode are grayed out and not selectable. When 'BIOS File' is chosen as the operating target, the 'Select Input BIOS File' button allows you to load a congatec system BIOS that will be used as a base for all following operations. After selecting the input BIOS file, you will be asked to specify an output file that should be used to store any modifications that might be performed later on. If you select the original input BIOS file again, all modifications will be automatically stored in this original file without any further notification. If you want to keep the original input BIOS file, it is recommended to specify a new file as output target for modifications. In case you do not plan to modify the BIOS at all, you can also work with the original input BIOS file in read only mode. To do this, cancel the output file selection.

3.1 congatec System Utility Main Module

3.1.1 Windows GUI Version



After selecting the input BIOS file, the following dialog appears:



Enter a new BIOS file name if the original BIOS file should not be changed. Press 'Cancel' to continue in 'read-only' mode (the BIOS modifications can not be stored).

3.1.2 Command Line Versions

When using the command line versions of the congatec System Utility (CGUTLCMD), the desired function module must be selected by passing a module selection parameter. If a module can be used in 'Board' and 'BIOS File' mode, the operating target must also be selected by passing the respective parameter.

Calling CGUTLCMD without any parameters provides an overview of the available function module selection parameters. Invoking CGUTLCMD with a function module selector as the only parameter displays the module's usage description. All parameters are accepted in lower and upper case letters, although all descriptions use upper case.

To support batch file operations, CGUTLCMD sets an error level of one or higher, to indicate an execution error. Error level zero indicates success.

Example:

```
c:\> CGUTLCMD
```

Output:

```
BCPROG        Board Controller Firmware Update Module
BFLASH        System BIOS Update Module
CPANEL        Panel Configuration Module
MODULE        BIOS Module Modification  Module
CGINFO        Board/BIOS Information Module
c:\> CGUTLCMD BFLASH
```

Output:

```
Usage description for the BIOS update module.
```

BIOS Update And Write Protection

Most congatec boards support the 'BIOS Update And Write Protection' feature. If this feature is enabled in the BIOS setup menu, all write and erase accesses to the target system's Flash Memory chip are blocked. This would also block all functions of the congatec System Utility that require flash write or erase accesses (e.g. BIOS update or any BIOS modifications in 'Board' mode). In order to allow BIOS updates or BIOS modifications in 'Board' mode even if the protection is enabled, the utility includes functions to temporarily deactivate the 'BIOS Update And Write Protection' by passing the correct deactivation password to the system.

For more information about the 'BIOS Update And Write Protection' feature and the handling of the protection by the congatec System Utility, refer to the congatec application note AN5_BIOS_Update_And_Write_Protection.

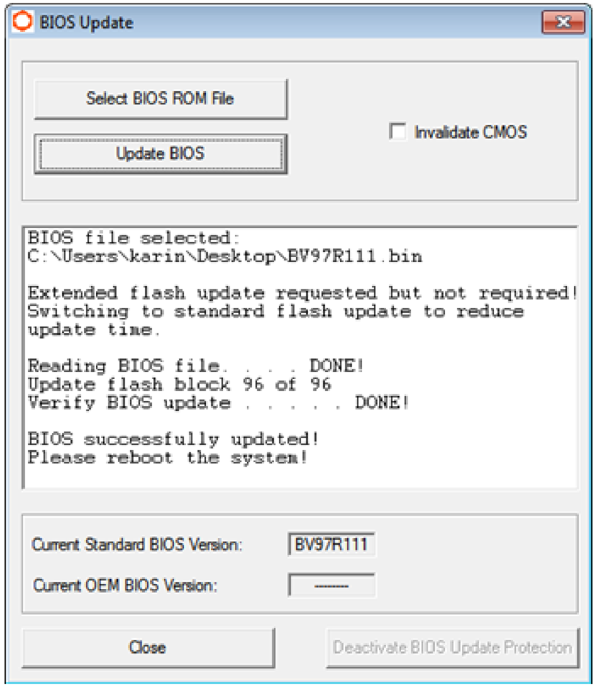
3.2 BIOS Update Module

This module allows you to update the BIOS of a congatec board. The respective BIOS file is checked for consistency and compatibility (i.e. whether it may or may not be used with the respective target board). The BIOS will not be programmed if the BIOS file is not a valid BIOS or it has not been created for the target system.

Note

The BIOS Update Module is only supported when the congatec System Utility is in 'Board' mode.

3.2.1 Windows GUI Version



```
BIOS file selected:
C:\Users\karin\Desktop\BV97R111.bin

Extended flash update requested but not required!
Switching to standard flash update to reduce
update time.

Reading BIOS file. . . . DONE!
Update flash block 96 of 96
Verify BIOS update . . . . . DONE!

BIOS successfully updated!
Please reboot the system!
```

Current Standard BIOS Version: BV97R111

Current OEM BIOS Version: --------

Available functions:

[Select BIOS File]	Select the BIOS file that should be programmed.
[Update BIOS]	Start flash programming (can only be selected after the BIOS file has been chosen).
[Deactivate BIOS Update Protection]	This function is only available and required if the 'BIOS Update And Write Protection' feature is available and activated in the current BIOS. In this case, write and erase accesses to the target's Flash Memory chip are only possible after temporarily deactivating the protection. This can be done by passing the correct deactivation password using the dialog started with this button.

Additional control flags:

[Invalidate CMOS]	Invalidate the contents of the CMOS RAM in the Real Time Clock after BIOS programming (usually not necessary anymore).

During the BIOS update process, the central display section shows progress or error messages.

Note

The 'Current Standard BIOS Version' and 'Current OEM BIOS Version' displayed on the window always refer to the BIOS currently stored in the flash part. After a BIOS update, the new BIOS in the flash part will become active only after rebooting the board.

3.2.2 Command Line Versions

Function module selector:

```
BFLASH
```

Syntax:

```
CGUTLCMD BFLASH <BIOS file> [options / commands]
```

Syntax description:

<BIOS file>	Name of the BIOS file to be programmed.

Options:

/E	Perform extended/full flash update instead of BIOS content only (standard) flash update.
/EF	Force extended/full flash update instead of BIOS content only (standard) flash update.
/EM	Perform extended/full flash update instead of BIOS content only (standard) flash update. Manufacturing mode. No automatic reboot after BIOS update.
/EFM	Force extended/full flash update instead of BIOS content only (standard) flash update. Manufacturing mode. No automatic reboot after BIOS update.
/D	Defer BIOS update. If this parameter is passed, the BIOS update process will stop after preprocessing and allow you to switch to a different Flash Memory chip.
/C	Invalidate the contents of the CMOS RAM in the Real Time Clock after BIOS programming. This option is obsolete and only maintained for backwards compatibility.
/NOC	Do not invalidate the contents of the CMOS RAM in the Real Time Clock after BIOS programming. This option is obsolete and only maintained for backwards compatibility.
/AOO	Perform immediate/automatic off-on cycle to unlock extended BIOS Flash Memory area if necessary. Default for DOS and UEFI Shell versions. Use to override OS dependent default unlock behavior of /E, /EM, /EF, /EFM BIOS update options.
/NAOO	Do NOT perform immediate/automatic off-on cycle to unlock extended BIOS Flash Memory area. Requires manual off-on cycle to make unlock effective. Default for all other OS versions. Use to override OS dependent default unlock behavior of /E, /EM, /EF, /EFM BIOS update options.
BP:xxx	Specify password to deactivate the 'BIOS Update And Write Protection'. This option can also be used without the 'BIOS File' parameter (i.e. CGUTLCMD BFLASH /BP:password) to deactivate the 'BIOS Update & Write Protection' without updating the BIOS. This is required in order to allow other functions of the utility to perform necessary flash write accesses.

Commands:

The commands /EIL, /EU, /EUM, /EL, /ELM do not require a <BIOS file> parameter, as none of them start an actual BIOS update.

/EIL	Check whether extended BIOS area is locked.
/EU	Unlock extended BIOS area for update and execute automatic off-on cycle to make unlock effective.
/EUM	Unlock extended BIOS area for update without automatic off-on. Requires manual off-on cycle to make unlock effective.
/EL	Lock extended BIOS area and execute automatic off-on cycle to make lock effective.
/ELM	Lock extended BIOS area without automatic off-on cycle. Requires manual off-on cycle to make lock effective.

The extended/full flash update is necessary to perform an update of the complete flash contents on systems that contain additional data in the BIOS Flash Memory chip besides the actual system BIOS. This is the case for most newer congatec products based on Intel technology. The BIOS Flash Memory chip areas that contain this additional data are write-locked by default and have to be unlocked before being updated. This unlock typically requires an automatic or manual board off-on cycle, which is (if necessary) initiated by the first call of the BIOS update command. After the automatic or manual off-on cycle the board should start in unlocked mode. The BIOS update command has to be called again then, this time resulting in an actual BIOS update.

All /E… options and commands as well as /AOO and /NAOO options are related to this extended/full flash update and lock/unlock handling.

With options /E and /EM the extended flash update is only performed if the extended flash content has changed. If not, the utility automatically switches to the standard, faster BIOS content-only update. With options /EF and /EFM the extended update is performed, even if not mandatory. For systems that do not support or require an extended flash update at all, the options /E and /EF are simply ignored. A standard BIOS content only update is performed instead.

When starting a BIOS update with /E, /EM, /EF and /EFM options, the DOS and UEFI Shell versions of CGUTLCMD by default perform an immediate (forced) off-on cycle to unlock extended BIOS Flash Memory areas if necessary. For other OSes, CGUTLCMD does not perform such an automatic (forced) off-on cycle to avoid OS / file system corruption. The necessary off-on cycle has to be initiated by other means (software controlled or manually). The options /AOO and /NAOO may be used to override the default unlock off-on cycle behaviour for each CGUTLCMD version. The standalone commands /EIL, /EU, /EUM, /EL, /ELM can be used to check and control the extended BIOS Flash Memory area lock state without actually starting a BIOS update.

Recommended usage:

```
CGUTLCMD BFLASH BIOSFILE.BIN /E
```

The following exit codes may be returned by the BIOS update module:

0x00	Success.
0x01	General error.
0x02	Interface access or initialisation error.
0x03	BIOS incompatibility error.
0x04	The specified file is not a valid BIOS file.
0x05	BIOS size mismatch.
0x06	Error processing file.
0x07	Extended flash update not possible.
0x08	This platform/BIOS requires an extended/full flash update. Use parameter /E to update.
0x09	Failed to unlock flash for extended update.
0x0A	Failed to lock flash after extended update.
0x0B	Extended update initiated but not (yet) completed. Perform manual soft off-on cycle and relaunch the process to complete the update.

Booting from one Flash Memory chip and flashing the other:

If you have two BIOS Flash Memory chips (one on the module and one on the baseboard) you can boot from either and flash the other. This feature is most helpful if one BIOS becomes corrupted and unable to boot the system. You can restore it using the other BIOS. The procedure for GUI and command line versions is explained below.

GUI Version:

After booting from the current Flash Memory chip, the BIOS Update Module of the congatec System Utility must be launched before switching to a different flash part. Once the BIOS Update Module window is started, it is safe to switch to another flash part and the BIOS update process can be performed as usual.

Command Line Versions:

Before switching to another flash part, launch the utility with the following parameters:

```
CGUTLCMD BFLASH BIOSFILE /D
```

The utility will start as usual, perform the required preprocessing and will then stop and inform you that it is now safe to switch to another flash part. After doing this and pressing a key to confirm, the BIOS update process will be performed as usual.

Note

Keep in mind that an extended / full flash update (initiated using /EF option) is mandatory when writing a BIOS to a Flash Memory chip that has not been programmed before with a BIOS valid for the board in use. This option can be combined with the /D option:

```
CGUTLCMD BFLASH BIOSFILE /EF /D
```

3.3 Firmware Update Module

3.3.1 General Description

All congatec boards are equipped with an onboard microcontroller. Together with the respective firmware, this microcontroller provides a common set of dedicated add-on functions found on all congatec boards.

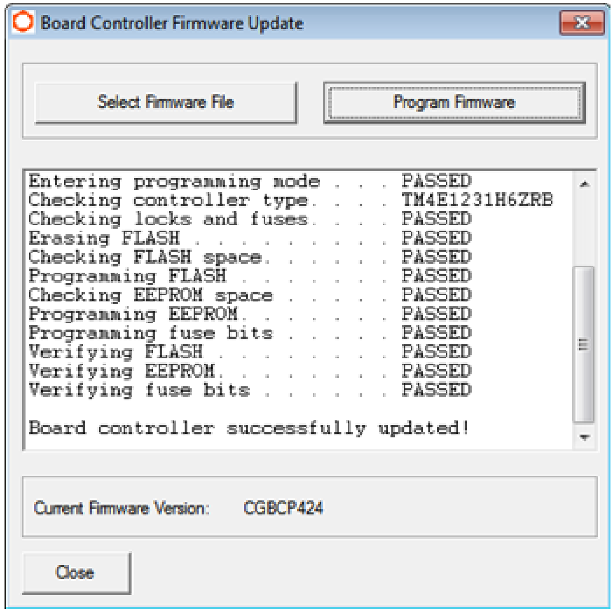
Use the Firmware Update Module of the congatec System Utility to update the firmware of the congatec board controller. Integrated check and validation routines ensure that only valid and compatible firmware files are programmed.

Although the board controller performs an internal restart after firmware updates, it is recommended to shut down and restart the system once a new firmware has been programmed.

Note

The Firmware Update Module is only supported when the congatec System Utility is in 'Board' mode.

3.3.2 Windows GUI Version



```
Entering programming mode . . . PASSED
Checking controller type. . . . TM4E1231H6ZRB
Checking locks and fuses. . . . PASSED
Erasing FLASH . . . . . . . . . PASSED
Checking FLASH space. . . . . . PASSED
Programming FLASH . . . . . . . PASSED
Checking EEPROM space . . . . . PASSED
Programming EEPROM. . . . . . . PASSED
Programming fuse bits . . . . . PASSED
Verifying FLASH . . . . . . . . PASSED
Verifying EEPROM. . . . . . . . PASSED
Verifying fuse bits . . . . . . PASSED

Board controller successfully updated!
```

Current Firmware Version: CGBCP424

Available functions:

[Select Firmware File]	Select the board controller firmware file that should be programmed.
[Program Firmware]	Start programming of the board controller (can only be selected after the firmware file has been chosen).

During the firmware update process, the central display section of the window will show progress or error messages.

The 'Current Firmware Version' displayed on the window always refers to the firmware that is currently used by the board controller. As the board controller performs an internal restart after programming, this information is immediately updated when the firmware has been programmed.

3.3.3 Command Line Versions

Function module selector:

```
BCPROG
```

Syntax:

```
CGUTLCMD BCPROG <firmware file> [options]
```

Syntax description:

<Firmware file>	Name of the firmware file to be programmed.

Options:

/B	Batch mode. No user queries are performed.
/F	Fast mode. Verification of the update process is skipped.
/Q	Quick mode. Verification of unused space is skipped.
/S	Silent mode. All screen outputs except for error messages are suppressed.
/V	Verbose mode. Enables additional diagnostic output.

Recommended usage:

```
CGUTLCMD BCPROG FIRMWARE.DAT
```

Caution

Do not update the board controller unless it is explicitly recommended by congatec.

The additional parameters offered by the command line versions are meant for congatec internal purposes only. They are listed here for completeness but should not be used by congatec customers.

3.4 Panel Configuration Module

3.4.1 General Description

All congatec boards support the EDID™ 1.3 based EPI (Embedded Panel Interface) specification for configuration of local flat panels.

The congatec system BIOS includes a table of predefined and validated EPI data sets for standard panels (called the EPI Panel Data module or simply the EPI module) as well as placeholders for up to three (depends on the actual BIOS) OEM EPI data sets for custom panels within the standard EPI module. The standard and OEM panel data sets of this module can be selected via the BIOS setup menu and will be used for panel configuration during startup. Furthermore, an auto panel detection mechanism can be selected in the setup. In this case, the BIOS tries to find and use an EPI or EDID™ 1.3 data set in an off-board EEPROM connected to the EPI I2C bus (referred to as EPI EEPROM from now on).

The congatec System Utility allows you to save and update the whole EPI module, save and update the OEM specific EPI data sets within the standard EPI module, as well as reading, writing and clearing the EPI EEPROM. Standard EPI data sets included in the EPI module can be extracted and saved to a file. This file can then be programmed to an EPI EEPROM or used as a base to create a new EPI data set for an OEM panel.

The utility verifies the validity of all data written to any of the locations. The standard EPI BIOS module can only be replaced by a valid congatec EPI BIOS module. The OEM panel data set must be a valid EPI or standard EDID™ 1.3 data set. The EPI EEPROM can be programmed with EPI or EDID™ 1.3 data sets.

In addition to panel data set handling, the command line versions of the 'Panel Configuration Module' also include functions to block and unblock the backlight enable signal of the video controller as well as functions to control the backlight intensity using the method or device selected in BIOS setup. The GUI version also offers a sub module to check, create or modify EPI data sets.

Refer to the EPI specification and further congatec documentation for detailed information about the EPI standard and the congatec EPI implementation, as well as for detailed information about the panel configuration data set formats mentioned above.

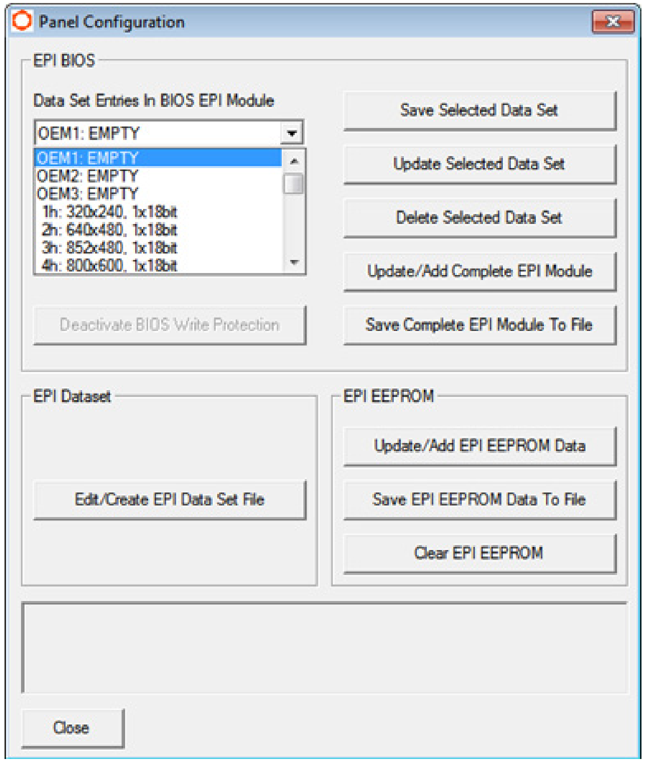
Note

EPI BIOS module handling and OEM EPI data set handling are supported in 'Board' and BIOS File' mode. Access to the EPI EEPROM requires the respective hardware and is therefore supported in 'Board' mode only. EPI data set creation and modification is supported in all modes, including the special 'EPI File Only' mode but only by the GUI version of the utility.

Since the EPI BIOS module is part of the system BIOS, updating this module or updating the OEM EPI data set within this module means that the original system BIOS must be modified and therefore obviously is no longer the exact same BIOS. This fact is tracked and indicated later on when using the modified BIOS. To do this in a defined way, it is recommended to assign an OEM version to the BIOS when updating the EPI module or the OEM EPI data set. Please refer to the description of the BIOS Module Modification Module in section 3.4 of this user's guide for more information about how to do this.

3.4.2 Windows GUI Version

3.4.2.1 Panel Configuration Main Window


Panel Configuration
EPI BIOS
Data Set Entries In BIOS EPI Module
Save Selected Data Set
Update Selected Data Set
Delete Selected Data Set
Update/Add Complete EPI Module
Deactivate BIOS Write Protection
Save Complete EPI Module To File
EPI Dataset
Edit/Create EPI Data Set File
EPI EEPROM
Update/Add EPI EEPROM Data
Save EPI EEPROM Data To File
Clear EPI EEPROM
Close

OEM1: EMPTY

OEM1: EMPTY
OEM2: EMPTY
OEM3: EMPTY
1h: 320x240, 1x18bit
2h: 640x480, 1x18bit
3h: 852x480, 1x18bit
4h: 800x600, 1x18bit

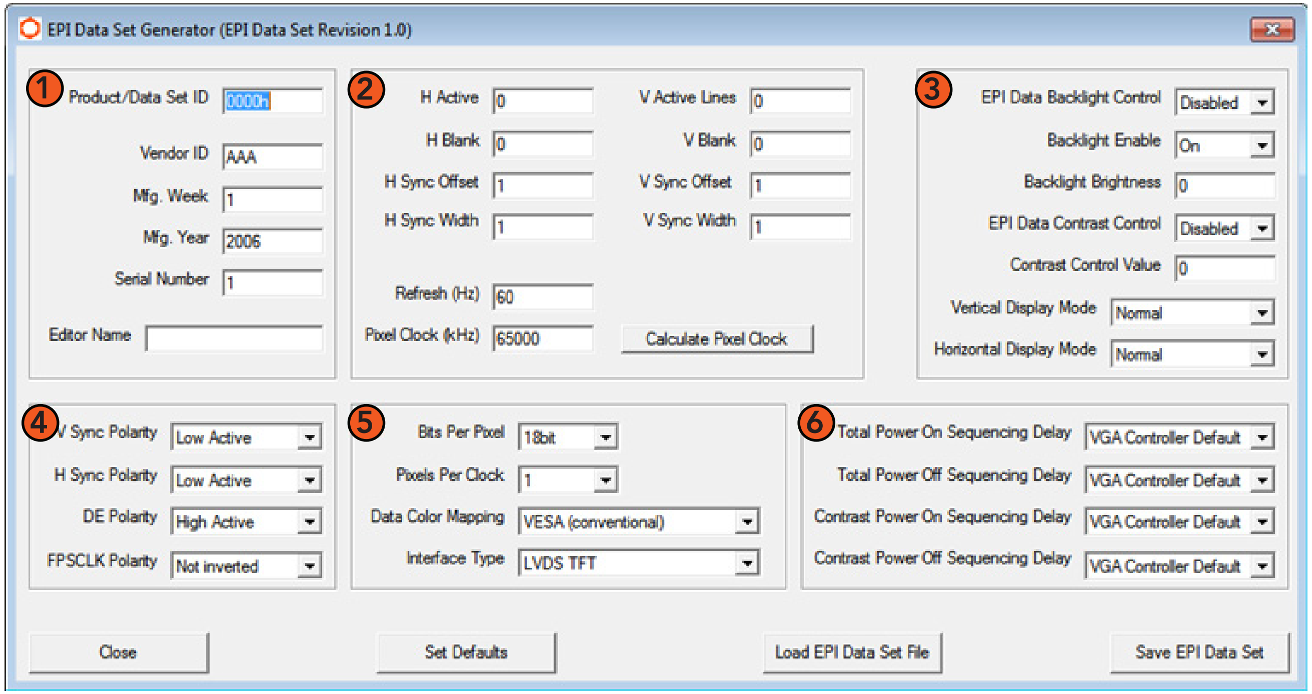
The ‘Data Set Entries In BIOS EPI Module’ window shows a list of all EPI panel data sets included in the EPI module of the current BIOS. Entries marked as ‘OEM’ represent the placeholders for OEM panel data sets that can be ‘filled’ with own data sets. The other data set entries are standard congatec data sets that can only be read but not updated.

The output window below the function buttons is used to display additional information, error and operation progress messages.

Available functions:

[Save Selected Data Set]	Save the data set selected in the 'Data Set Entries In BIOS EPI Module' window to a file.
[Update Selected Data Set]	This function becomes available if you select one of the OEM entries in the 'Data Set Entries In BIOS EPI Module' window. It allows the addition of an OEM defined EPI or standard EDID™ 1.3 panel data set to the standard EPI module of the system BIOS or replace an already existing OEM panel data set entry. Standard congatec EPI data sets cannot be updated.
[Delete Selected Data Set]	This function becomes available if you select one of the OEM entries in the 'Data Set Entries In BIOS EPI Module' window. It allows the deletion of OEM defined EPI or standard EDID™ 1.3 panel data sets from the standard EPI module. Standard congatec EPI data sets cannot be deleted.
[Update/Add Complete EPI Module]	Add or replace the complete congatec EPI BIOS module. This module can only be provided by congatec and includes the OEM panel data sets.
[Save Complete EPI Module To File]	Save the complete congatec EPI module included in the BIOS to a file.
[Deactivate BIOS Write Protection]	This function is only available and required in 'Board' mode and only if the 'BIOS Update And Write Protection' feature is available and activated in the current BIOS. In this case write and erase accesses to the target's Flash Memory chip and therefore all BIOS modifications in 'Board' mode are only possible after temporarily deactivating the protection. This can be done by passing the correct deactivation password using the dialog started with this button.
[Edit/Create EPI Data Set File]	Opens the 'EPI Data Set Generator' sub module, which allows the creation of a new EPI data set file. If a data set entry has been selected from the BIOS data set list the corresponding data will be used as a base for further modifications. If no entry has been selected then data set creation must be done from scratch.
[Update/Add EPI EEPROM Data]	Write one of the above described panel data sets to the EPI EEPROM. This function is only available in 'Board' mode.
[Save EPI EEPROM Data To File]	Read a panel data set from the EPI EEPROM and save it to a file. This function is only available in 'Board' mode.
[Clear EPI EEPROM]	Clear the EEPROM connected to the EPI I2C bus. This function is only available in 'Board' mode.

3.4.2.2 EPI Data Set Generator



Product/Data Set ID	0000h
Vendor ID	AAA
Mfg. Week	1
Mfg. Year	2006
Serial Number	1
Editor Name	

H Active	0	V Active Lines	0
H Blank	0	V Blank	0
H Sync Offset	1	V Sync Offset	1
H Sync Width	1	V Sync Width	1
Refresh (Hz)	60		
Pixel Clock (kHz)	65000		

EPI Data Backlight Control	Disabled
Backlight Enable	On
Backlight Brightness	0
EPI Data Contrast Control	Disabled
Contrast Control Value	0
Vertical Display Mode	Normal
Horizontal Display Mode	Normal

V Sync Polarity	Low Active
H Sync Polarity	Low Active
DE Polarity	High Active
FPSCLK Polarity	Not inverted

Bits Per Pixel	18bit
Pixels Per Clock	1
Data Color Mapping	VESA (conventional)
Interface Type	LVDS TFT

Total Power On Sequencing Delay	VGA Controller Default
Total Power Off Sequencing Delay	VGA Controller Default
Contrast Power On Sequencing Delay	VGA Controller Default
Contrast Power Off Sequencing Delay	VGA Controller Default

The 'EPI Data Set Generator' module allows the creation of new EPI panel data sets for OEM panels either from scratch or based on one of the congatec standard EPI data sets.

① Define the product data as desired (format and field size limitations apply). Helps to organize and identify different data sets. congatec uses the 'Product/Data Set ID' field to identify a certain released EPI data set. Use IDs above 0FFh to avoid confusion with data set IDs defined by congatec.

② Define the resolution and the timing parameters for a certain panel. These values can be derived from the respective panel datasheet.

③ Define the synchronization signal polarities. The respective values are either defined in the panel's datasheet or must be selected according to the actual hardware design.

④ Define basic technology parameters of the selected panel.

⑤ Define backlight and contrast control values within the EPI data set as well as the desired image orientation.

⑥ Define power on/off sequencing delay values in the EPI data set. For more information on this module, refer to congatec application note AN12_Modify_EPI_Files.

3.4.3 Command Line Versions

Function module selector:

```
CPANEL
```

Syntax:

```
CGUTLCMD CPANEL  /OT:[target]  /[command]  [parm]
```

Syntax description:

/OT:	Specify the operating target. BOARD: All actions result in direct hardware accesses to the respective congatec board. All other strings are interpreted as name of the BIOS file to be modified.
parm	Command parameter, if required (e.g. filename of data file).

Commands:

/SEPI	Find congatec EPI module and save it to a file specified by PARM.
/LEPI	Add or replace the complete congatec EPI module. PARM must specify the name of a valid congatec EPI module file.
/SSTD:xxx	Find standard EPI data set number xxx (hexadecimal) in the BIOS and save it to a file specified by PARM.
/SOEM:xxx	Find OEM EPI data set number xxx (hexadecimal) in the BIOS and save it to a file specified by PARM.
/LOEM:xxx	Add or replace OEM EPI or EDID™ 1.3 panel data set number xxx (hexadecimal). PARM must be set to the name of a valid EPI or EDID™ 1.3 panel data file.
/DOEM:xxx	Delete OEM EPI or 1.3 panel data set number xxx (hexadecimal).
/SEEP	Read panel data set stored in the EPI EEPROM and save it to a file specified by PARM. This function is only available in 'Board' mode.
/LEEP	Write data to congatec EPI EEPROM. PARM must be set to the name of a valid panel data set file. This function is only available in 'Board' mode.
/CEEP	Clear the EPI EEPROM. This function is only available in 'Board' mode.
/SBLV	Set control value of a backlight intensity control device. (PARM: 0-100; value in percent of maximum value). This function is only available in 'Board' mode.
/GBLV	Get current value of backlight intensity control device. (Value returned in percent of maximum value). This function is only available in 'Board' mode.
/SBLS	Set backlight enable state (PARM:0=OFF 1=ON). This function is only available in 'Board' mode.
/GBLS	Get backlight enable state (0: OFF 1: ON). This function is only available in 'Board' mode.
/DPL	Display list of EPI data sets included in the BIOS.

Note

When the 'BIOS Update And Write Protection' feature is enabled in BIOS setup, commands that try to write to the BIOS Flash Memory chip will fail. In order to deactivate the BIOS write protection until next boot use: 'CGUTLCMD BFLASH /BP:[password]'

3.5 BIOS Module Modification Module

3.5.1 General Description

The congatec system BIOS offers support for several OEM defined add-on BIOS modules. Each congatec BIOS includes a flash storage area, called the Multi Purpose Flash Area (MPFA), where these add-on modules, along with predefined congatec standard modules, can be stored. Modules located in this area consist of a MPFA header for organization purposes and the actual module data defined and provided by the OEM or predefined by congatec.

The standard system BIOS includes routines to handle different MPFA module types. The BIOS identifies the respective module by evaluating the module type field in the MPFA header of the module and executes the appropriate function for this module type during POST. All modules use at least the module type, module ID and module revision fields of the MPFA module header. If different modules of a certain type are to be added to the BIOS, these modules must have different module IDs in order to be differentiated. The module revision field is for information purposes only, in order to keep track of module versions. Depending on the module type, additional information put into the module header might be required to handle the respective module. If this is the case, it will be noted in the following module descriptions.

The congatec System Utility provides functions to create, add, replace, save and delete the BIOS add-on modules, extract module data and generate a report of all currently included modules. Adding or deleting BIOS modules obviously means that the standard congatec BIOS is modified (either a BIOS file if working in ‘BIOS File’ mode, or the BIOS stored in the onboard Flash Memory chip if working in ‘Board’ mode). In order to distinguish an OEM modified BIOS from the standard congatec BIOS version that it is based on, the utility also allows you to assign an OEM BIOS version to the modified BIOS. This OEM version will be displayed during POST and in the setup menu in addition to the standard BIOS version.

Note

All functions of the BIOS Module Modification Module are supported when the congatec System Utility is in ‘Board’ and ‘BIOS-File’ mode.

3.5.2 BIOS Module Types

3.5.2.1 Current Setup Settings Module (old: CMOS Backup Map)

This module contains a copy of the current BIOS setup settings. It is generated automatically by the BIOS when leaving the setup using the 'Save and Exit' option and written to the BIOS flash chip. The BIOS setup settings stored in this module represent and define the currently active BIOS setup configuration. By reading the automatically generated BIOS setup settings module from a certain board and deploying it to other boards of the same kind using this utility, OEMs can easily clone setup settings. Only BIOS setup settings modules created for the same board and BIOS version can be added, everything else will be rejected by the utility.

Currently, only one BIOS setup settings module is supported. The module ID parameter is reserved for future usage and must always be set to zero or 0xFF for now.

Note

This module type was called 'CMOS Backup Map' in the past (congatec System Utility versions prior to 1.5.7).

3.5.2.2 Default Setup Settings Module (old: CMOS Default Map)

This module can be used to override the build time defined BIOS setup default values of a congatec BIOS. If a valid setup default settings module is found by the respective BIOS module handler, the values stored within this module will be used as setup default values instead of the build time defined standard setup default values, whenever the setup defaults are loaded in the BIOS setup menu.

The easiest way to create an OEM specific default setup settings module is to configure a certain congatec board to the settings required as default values and exit the setup menu using the 'Save and Exit' option. The BIOS will automatically create a current setup settings module using the configured values. In order to generate a default setup settings module, the generated current setup settings module must be loaded as an input data file to generate a default setup settings module. The default setup settings module in turn can be added to all target boards and will be used as OEM specific setup default value map. In order to go back to the original build time defined setup default values, the OEM default setup settings module simply must be deleted.

Only default setup settings modules created for the same board and BIOS version can be added, everything else will be rejected by the utility. A standard congatec BIOS only supports one active default setup settings module. The module ID parameter for this module must always be set to zero.

Refer to the congatec application note AN8_Create_OEM_Default_Map for detailed information about how to create and add an OEM default setup settings module.

Note

This module type was called 'CMOS Default Map' in the past (congatec System Utility versions prior to 1.5.7).

3.5.2.3 Fixed Setup Settings Module (old: Fixed CMOS Settings Map)

Reserved for future usage.

3.5.2.4 OEM Code / Data Module (obsolete / deprecated for UEFI based systems)

OEM BIOS modules can be used to add OEM defined data or code blocks to the standard system BIOS. By setting the load time, execution time and load address values within the MPFA header, OEMs can define when the respective module should be loaded to RAM and executed during BIOS POST. OEM BIOS code modules may be used to perform custom specific hardware initialization, pre-boot software checks, user authentication or even skip parts of the standard BIOS boot process and create own boot loaders.

Any number of OEM BIOS modules can be added to the system BIOS as long as there is enough space left in the MPFA. However, if more than one OEM BIOS module should be used, each module must be given a unique module ID in the MPFA header. In case an OEM BIOS module is added with the module ID of an already existing OEM BIOS module, the existing module will be replaced by the new one without special notification.

In addition to module type, module ID and module revision that must be configured for any BIOS add-on module in the MPFA header, several other MPFA fields must be set for OEM BIOS modules as well:

1. Load and Execution Time

Load and execution time fields define at which point during BIOS POST the OEM module should be copied to RAM and executed. The following load and start time hooks are supported:

NONE	Do not load/execute the OEM module. Choosing one of the load times listed below and using NONE as an execution time, can be used to load an OEM data block to the upper memory area and keep it there to be used by an OS application.
BEFORE_CMOS_TEST	Load/execute before CMOS test. On AMIBIOS based products, this is one of the first hooks of the main BIOS (i.e. bootblock execution has just been finished). Only basic chipset and memory initialization has been performed at this point in time. PCI and Super I/O devices are not yet configured and none of the standard BIOS runtime interfaces are available. OEM code executed at this point should only be developed in close cooperation with congatec.
BEFORE_VIDEO_INIT	Load/execute before video BIOS initialization. Hardware resources have been assigned to video and other output devices. Final video and output device configuration will follow immediately after this point.
AFTER_VIDEO_INIT	Load/execute after video BIOS initialization. Video and other output devices are fully initialized and configured. At this point the video BIOS INT10h interface becomes available.
BEFORE_OPROM_SCAN	Load/execute before option ROM scan. Hardware resources have been assigned to all PCI devices. All Super I/O devices are initialized.

AFTER_OPROM_SCAN	Load/execute after option ROM scan. At this point all PCI and Super I/O devices are fully initialized and configured. Mass storage devices have been detected and configured. All BIOS runtime services are available. All option ROMs have been initialized.
BEFORE_SETUP	Load/execute on setup screen start. OEM code using this hook will be executed when the setup screen is started.
SETUP_EXTENSION	Load/execute as setup screen extension. In case an OEM module is defined with this load and execution point, an additional setup node 'OEM Setup Utility' will be displayed in the setup screen. When selected, the respective OEM code is executed, e.g. to configure special hardware.
BEFORE_BOOT	Load/execute at end of BIOS POST. Every BIOS initialization task has been performed at this point and every BIOS runtime interface is available. The only thing that remains to be done is to search the detected boot devices for an OS loader and start the OS. Recommended execution point for an OEM defined OS loader.

The above load and execution time hooks are given in the order they are executed during BIOS POST. Do not set the load time later than the execution time, such a configuration will be rejected by the congatec System Utility.

2. Load Address

The load address field defines the physical memory address the OEM module should be copied to. Setting a fixed load address is possible but might be difficult to handle as the OEM may not know which memory ranges are not already used by parts of the BIOS.

Therefore, it is recommended to use the the following special address selectors instead of 'real', fixed addresses.

00000000h	Load module at any free upper memory block address (640k...1MB).
FFFFFFFEh	Load module at any free conventional memory address (0k...640k).
FFFFFFFFh	Load module at any free extended memory address (above 1MB).

Note

The standard BIOS may clear conventional RAM prior to OS boot. Moreover, operating systems may also clear the conventional RAM as well as the extended memory area during startup. Therefore, OEM code loaded to these areas may not be available after the OS starts.

3. Entry Offset

The entry offset field specifies the location within the OEM code block relative to the start of the block. The BIOS OEM code handler jumps to this location within the OEM module to start execution. Only the offset to the start of the OEM defined data block must be specified; the additional offset due to the MPFA header generated by the congatec System Utility will be calculated by the BIOS OEM code handler.

Note

The BIOS OEM code handler is a very simple and limited execution engine. It only copies the OEM code block to the given load address in RAM at the specified time during POST and performs a far call to the defined entry offset. Any sort of standard executable header will not be evaluated. Throughout the BIOS POST, the so called big real mode is used. This means that only real mode code execution is natively supported. Flat mode memory data accesses are possible using the ES and DS segment/selector registers set to zero. Any sort of protected mode code can only be executed if the OEM code block performs the required initialization in the code part starting at the specified entry offset. The OEM code can return to the standard BIOS POST flow by performing a far return. However, this can only be successful if the memory model is unchanged, the stack is cleaned up and all registers are restored to original values.

Simple real mode COM style executables or real mode option ROM like code blocks are best suited to be included as OEM code modules.

Caution

The congatec System Utility cannot perform any sort of validity check on OEM BIOS code modules. If a corrupt OEM code module is added and executed during BIOS POST, the system may not boot anymore. Therefore, it should be considered as mandatory to prepare a backup copy of the original system BIOS on an external Flash Memory chip when testing OEM code modules.

Contact the congatec technical support before adding your own code to the BIOS. Especially the selection of the appropriate load and execution times should always be performed in cooperation with congatec.

Legacy OEM code / data module support on UEFI based systems:

Although still supported, the usage of legacy OEM code / data modules for UEFI / Aptio4 and AptioV based congatec products is deprecated. Only a subset of 16-bit code can be executed by or as part of the CSM module. This code is started and executed at the end of the UEFI POST. Therefore, early BIOS OEM code hooks are not implemented. In case the CSM module is not present or not started, legacy OEM code modules cannot be used at all and are simply ignored. OEM code data modules can still be added to the MPFA area and used in this context. However, they cannot be loaded to any other memory location.

Supported Load and Execution Time values for UEFI based systems with CSM enabled:

BEFORE_OPROM_SCAN	
AFTER_OPROM_SCAN	
BEFORE_SETUP	(code executed on start of setup menu or F11 fast boot selection)
BEFORE_BOOT	

'Magic' load addresses 00000000h and FFFFFFFEh for placement somewhere in UMB or somewhere in conventional memory below 1MB are supported. High address placement is NOT supported. Fixed address placement is supported but as usual not guaranteed to work and very likely to make the board unbootable!

The BEFORE_BOOT Load/Execution time selector does NOT support UMB placed code. Only conventional code placement and execution is supported for these Load/Execution times.

UEFI based systems (with CSM enabled) support real PCI/PCIe option ROM attachment for external PCI/PCIe devices. This is an enhancement compared to the BIOS OEM code support. A correctly configured PCI/PCIe option ROM OEM code module will be loaded and configured as if attached to the PCI/PCIe device. For example, all registers will be initialized as required according to PCI/PCIe option ROM specifications and PCI 3.0 option ROMs can be added as well.

For an PCI/PCIe option ROM attachment module, simply specify Load Time and Execution Time as NONE, the Entry Offset field as 00000000h and enter the PCI Vendor and Device ID into the Load Address field (e.g. 80861502h for some Intel ethernet controller).

In general the usage of native UEFI code (DXE drivers, UEFI boot loaders, …) placed in the OEM UEFI FW Volume Module is highly recommend for OEM code insertion on a UEFI based system. congatec provides a complete development system as well as sample DXE drivers, bootloaders and UEFI applications as reference.

3.5.2.5 EPI Panel Data Module

As described in the Panel Configuration Module section earlier, all congatec boards support the EDID™ 1.3 based EPI (Embedded Panel Interface) specification for configuration of local flat panels. The congatec system BIOS includes a table of predefined and validated EPI data sets for standard panels. These panel data sets, as well as placeholders for OEM defined panel data sets, are included in the EPI BIOS module, which is one of the predefined modules stored in the MPFA area. This module is required for fixed panel type selection via the BIOS setup menu. It is listed here for completeness only and should never be modified or deleted using the BIOS Module Modification Module of the congatec System Utility.

Refer to the congatec application note AN12_Modify_EPI_File for further information.

3.5.2.6 BIOS Boot Logo Module

The congatec system BIOS includes support to display OEM defined BIOS boot logos during POST. The congatec System Utility allows you to create the respective OEM logo modules and add them to the system BIOS. A standard congatec BIOS only supports one active OEM logo module. The module ID parameter for this module must always be set to zero. congatec's embedded BIOS may support JPEG, GIF and BMP images as input for OEM boot logos. BMP images with 16 colors, 256 colors and 24-bit colors are supported, as well as monochrome images and 32-bit color images with compression type 0. GIF logos must use 24-bit colors and can even be animated (if supported by the respective system BIOS).

It is recommended to use a JPEG image with the same resolution as the native resolution of the used display device, especially when working with LVDS flat panels. Here, YUV122 and YUV111 color component sampling is supported and the X-density/Y-density should be 1:1. However, not all JPEG formats and markers are supported.

In general, the following should be considered when a JPEG image is used as a boot logo:

- Extended sequential DCT is not supported.
- Define restart interval (DRI) is not supported.
- Progressive encoding is not supported.
- Lossless sequential encoding is not supported.
- Differential sequential DCT is not supported.
- Differential progressive DCT is not supported.
- The X-density/Y-density should be 1:1.

JPEG files created with digital cameras and some professional image processing tools often use a lot of these unsupported features and in particularly add the IPTC or EXIF information block. Therefore, a JPEG image must always be checked before being added to the BIOS. JPEG images that cannot be displayed by the BIOS might be rejected by the utility. When in doubt, or in case your JPEG image is not working, please contact your local congatec support.

Even though an OEM logo module can be added to the BIOS by the utility, it will not be activated automatically. Refer to the congatec application note AN11_Create_And_Add_Bootlogo for information about how to activate boot logo display and for further information about OEM boot logo creation in general.

Note

The boot display video mode will be selected automatically, depending on the image resolution. The video BIOS or UEFI GOP driver, as well as the display device, should support the appropriate resolution otherwise the result is unpredictable.

3.5.2.7 POST Logo Left Module

Like the full screen BIOS boot the small, left border aligned standard POST logo can also be replaced with an OEM logo packed into a POST logo left module.

Refer to the congatec application note AN11_Create_And_Add_Bootlogo for further information.

3.5.2.8 POST Logo Right Module

Like the full screen BIOS boot a small, right border aligned standard POST logo can also be replaced with an OEM logo packed into a POST logo right module. The POST logo right module is usually not supported by congatec default BIOS versions but may be included in customized BIOS variants. Refer to the congatec application note AN11_Create_And_Add_Bootlogo for further information.

3.5.2.9 OEM Setup BIOS Module (Core8 BIOS only; obsolete otherwise)

This module can be used to override the build time defined setup menu of a congatec BIOS. If a valid OEM setup module is found by the respective BIOS module handler, the setup menu layout stored within this module will be used instead of the build time defined standard setup menu. An OEM setup module can be created using the BIOS Setup Configuration module of the congatec System Utility.

The OEM setup module in turn can be added to all target boards and will be used as OEM specific setup menu. In order to go back to the original build time defined setup menu, the OEM setup module must be deleted.

Only OEM setup modules created for the same board and BIOS version can be added, everything else will be rejected by the utility.

A standard congatec BIOS only supports one active OEM setup module. The module ID parameter for this module must always be set to zero. Support for more than one OEM setup module in the same BIOS is possible but requires a special module selection OEM code BIOS module.

Please refer to the description of the BIOS Setup Configuration module in this document and to the congatec application note AN10_BIOS_Setup_Configuration for detailed information about how to create and add an OEM setup module.

3.5.2.10 OEM Video Mode Module

Recent congatec system BIOS versions for all congatec products based on Intel chipset include support to add additional OEM defined video modes to the standard video modes already offered by the video BIOS and UEFI GOP driver. The generic VESA frame buffer graphics drivers, the Intel graphics drivers for Windows operating systems and the Intel Linux graphics drivers, will also add these OEM video modes to their lists of supported video modes and resolutions. This feature is required in order to make the best use of a display offering a special resolution that by default is not supported by the video BIOS or previously mentioned graphics drivers.

In order to create an OEM video mode module, a valid EDID™ 1.3 or EPI data set (e.g. created using the EPI Data Set Generator) must be loaded as an input data file. Up to four OEM video mode modules (and thus up to four OEM video modes) can be added to the BIOS and are identified by the 'Module ID' parameter.

The OEM video modes will be assigned the following video mode numbers:

1. Module ID = 0

```
 8 bpp = VGA mode 60h / VESA mode 160h
16 bpp = VGA mode 61h / VESA mode 161h
32 bpp = VGA mode 62h / VESA mode 162h
```

2. Module ID = 1

```
 8 bpp = VGA mode 62h / VESA mode 163h
16 bpp = VGA mode 64h / VESA mode 164h
32 bpp = VGA mode 65h / VESA mode 165h
```

3. Module ID = 2

```
 8 bpp = VGA mode 66h / VESA mode 166h
16 bpp = VGA mode 67h / VESA mode 167h
32 bpp = VGA mode 68h / VESA mode 168h
```

4. Module ID = 3

```
 8 bpp = VGA mode 69h / VESA mode 169h
16 bpp = VGA mode 6Ah / VESA mode 16Ah
32 bpp = VGA mode 6Bh / VESA mode 16Bh
```

Note

For special resolution local flat panels, no additional OEM video mode module needs to be added in order to get support for the respective special video mode and resolution. The BIOS code will automatically add a corresponding OEM video mode for the panel deriving the required data directly from the EPI data set used for physical panel adaption.

These automatically added OEM video modes will be assigned the following video mode numbers:

```
 8 bpp = VGA mode 6Fh / VESA mode 16Fh
16 bpp = VGA mode 70h / VESA mode 170h
32 bpp = VGA mode 71h / VESA mode 171h
```

3.5.2.11 OEM HDA Verb Table Module

This module can be used to add OEM specific initialization tables for High Definition Audio Codecs to congatec system BIOS versions offering support for OEM HDA configuration. Detailed description of this feature and the required input data for this sort of module is beyond the scope of this document. Contact congatec technical support for more information about customized HDA codec initialization.

3.5.2.12 OEM SLP 1.0 Module / OEM SLIC Table Module / OA 3.0 Module

OEM activation technology allows system integrators to activate licensed copies of a Windows Operating System (OS). Therefore, end users of the embedded system do not have to activate the OS. When OEM Activation 2.1 or OEM Activation 3.0 is properly installed and set up, activating the Windows OS (Windows Product Activation) is no longer necessary.

- OA3.0 is supported by Windows 8 and Windows 10 and may be customized using an OEM OA 3.0 Module.
- OA2.1 is supported by Windows Vista, Windows 7 and Windows Server 2008. It can be customized using an OEM SLIC Table Module.
- OA1.0, also known as SLP, is available for Windows XP and Windows Server 2003. Can be customized using an OEM SLP 1.0 Module.

Please refer to the congatec application note AN21_Add_OEM_ACPI_SLIC_Table for further information on how to implement OEM activation 1.0, 2.1 and 3.0 on congatec embedded PC modules and SBCs using the congatec System Utility.

3.5.2.13 Standard VBIOS Module

Reserved for congatec internal usage.

3.5.2.14 OEM VBIOS Module

Reserved for congatec internal usage.

3.5.2.15 UEFI FW Volume Module

In general, the usage of native UEFI code (DXE drivers, UEFI boot loaders, …) placed in the OEM UEFI FW Volume Module is highly recommend for OEM code insertion on a UEFI based system. congatec provides a complete development system as well as sample DXE drivers, bootloaders and UEFI applications as reference.

Please contact your local congatec support for further information.

3.5.2.16 OEM Setup Menu Control Module

By adding this module, the user is able to apply a customized setup menu layout created using the congatec Setup Menu Layout Editor. The module allows to show, hide or gray-out a given setup node and change its title and help text.

It is not possible to change the default settings or change the options of a particular setup node. In case you want to do this, please refer to the congatec AN8_Create_OEM_Default_Map to learn how to change the default settings of a congatec embedded BIOS.

The BIOS Setup Configuration Module chapter in this document as well as the congatec application note AN35_BIOS_Setup_Configuration describe in detail how OEM Setup Menu Control Modules can be created using the Windows GUI version of the congatec System Utility. This function is not supported by the command line version of the utility (CGUTLCMD).

OEM Setup Menu Control Modules require a congatec embedded BIOS based on AMI's AptioV UEFI firmware implementation. Only BIOS releases after June 2016 might have the support built-in. One can check if the BIOS supports OEM setup modification by looking at the Save & Exit setup submenu. There must be an option for saving the current Setup Layout file by the item Generate Menu Layout File.

3.5.2.17 OEM SMBIOS Data Module

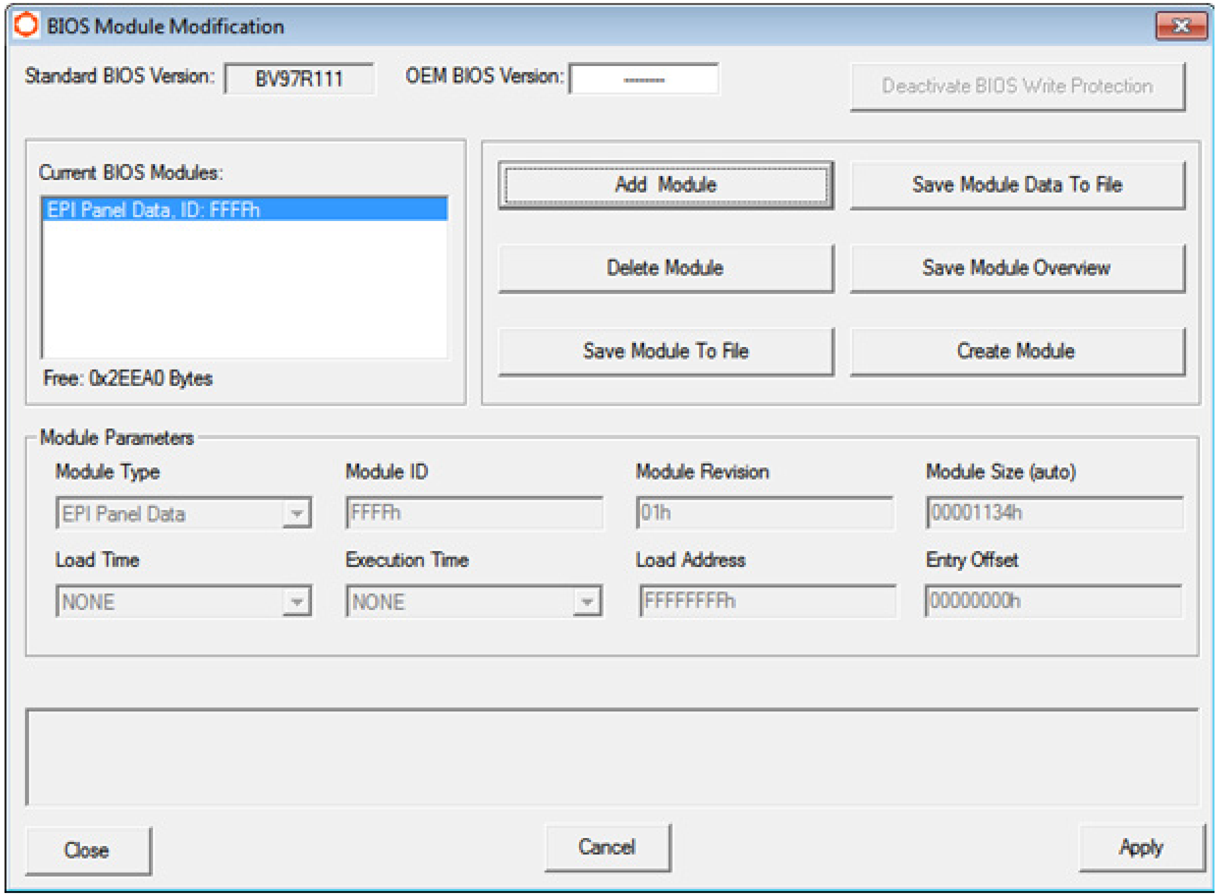
In its original state, the BIOS contains several hard coded DMI tables. In detail, these DMI tables are no simple tables with key-value pairs for each entry. They are compound data structures containing binary, numerical and text string members. The SMBIOS specification explains the details of each type of structure. The Linux tool dmidecode can show the contents of these tables in an interpreted way or raw data structures. On Windows, the tool RWEverything can do the same. How a particular operating system reads and utilizes the tables is beyond the scope of this document.

The BIOSes of the latest and future congatec products have a feature that allows customers to change the content of these tables. It is possible to overwrite some or all data of these tables. The modification data is contained in a software module which can be created with the congatec System Utility from a structured text file. An example text with all currently changeable elements is shown in the appendix of congatec application note AN34_OEM_SMBIOS. Please note that not all BIOSes support all elements or allow to modify all of them.

Currently, it is only possible to implement the changes to the tables by one single software module. When applying a new module, the previous changes will be deleted entirely. Therefore, if the modified data shall contain only static data, then the software module can also be included in a pre-programmed BIOS. If the modified data shall contain some static information, like manufacturer and type and some dynamic information like serial number, it is necessary to create for each manufactured unit its own data set composed of the static and the dynamic parts and flash it directly to the unit.

Please refer to the congatec application note AN34_OEM_SMBIOS for further information.

3.5.3 Windows GUI Version



Standard BIOS Version: BV97R111
OEM BIOS Version: --------

Current BIOS Modules:
EPI Panel Data, ID: FFFFh
Free: 0x2EEA0 Bytes

Module Parameters

Module Type	Module ID	Module Revision	Module Size (auto)
EPI Panel Data	FFFFh	01h	00001134h
Load Time	**Execution Time**	**Load Address**	**Entry Offset**
NONE	NONE	FFFFFFFFh	00000000h

Available functions:

[Add Module]	Add a congatec BIOS module to the operating target.
[Delete Module]	Delete the module selected in the 'Current congatec BIOS Modules' window.
[Save Module To File]	Save the BIOS module selected in the 'Current BIOS Modules' window. This will save the whole module, i.e. the actual module data as well as the module's MPFA header.
[Save Module Data To File]	Save the data of the module (without MPFA module header) selected in the 'Current BIOS Modules' window to a file.
[Save Module Overview]	Generates a list of all currently included BIOS MPFA modules and saves it to a file.

[Create Module]	The first click on this button will initiate the module creation process by asking the user to select a file containing the data that should be included in the module. After loading the module data file, the desired module type must be selected in the module type parameter field. Make sure that the module ID field is set according to the module description above and set the desired module revision. If the selected module type is 'OEM Code/Data', the additional parameter fields load time, execution time, load address and entry offset also must be configured and therefore become selectable. When all parameters are configured, click CREATE again to generate and save the created module to a file. This module file in turn can be added using the Add Module function.
[Deactivate BIOS Write Protection]	This function is only available and required in 'Board' mode and only if the 'BIOS Update And Write Protection' feature is available and activated in the current BIOS. In this case write and erase accesses to the target's Flash Memory chip and therefore all BIOS modifications in 'Board' mode are only possible after temporarily deactivating the protection. This can be done by passing the correct deactivation password using the dialog started with this button.

All actions of this function module are first performed in a temporary buffer and can be undone anytime by clicking the 'Cancel' button. The selected operating target is modified only after clicking the 'Apply' button. The top left section of the window provides an overview of the currently contained modules in the MPFA and informs you about the space left in the storage area. Selecting one of the displayed module entries updates the module parameter field with the parameters of this module. The output window below the module parameter field displays additional information, error and operation progress messages.

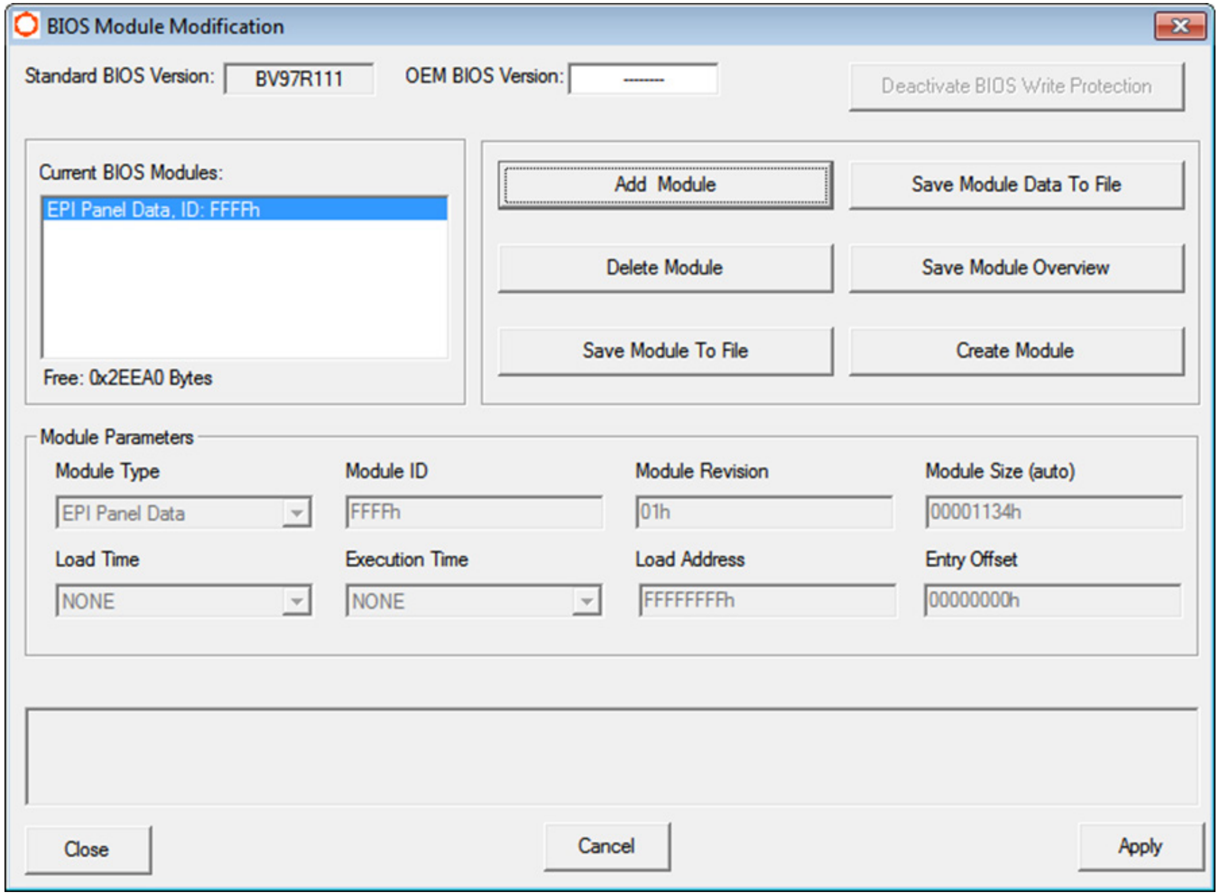
At the top of the window, the original congatec BIOS version and the OEM BIOS version of the current operating target are displayed. The congatec version field is included for reference purposes only and cannot be modified. The OEM BIOS version field can and should be used to assign an up to eight character add-on OEM BIOS version string to the modified BIOS. As long as no OEM version is assigned, this field will be blank. To assign an OEM version to the BIOS, simply enter the desired string in the field and press the 'Apply' button. The respective OEM version string will be displayed together with the standard BIOS version in the BIOS setup screen and on the BIOS boot screen. If a BIOS is modified by adding or deleting a BIOS module but no dedicated OEM version is assigned, the add-on version information would still be displayed in the setup screen or on the BIOS boot screen. However, in this case the OEM version would be set to 'UNKNOWN'. To avoid this, it is highly recommended to always set a defined OEM version string when modifying the BIOS and use that same OEM version string to name the OEM BIOS version file.

Note

A default setup settings module can only be generated out of a valid current setup settings module file as an input file. The default setup settings module cannot be generated using the data of the current setup settings module only. This ensures that a default setup settings module can only be generated out of data for the same BIOS version. The current setup settings module still includes information about the BIOS that the current setup settings have been derived from. The pure module data would not contain this information anymore. Thus, the respective information couldn't be added to the default module. A default setup settings module with invalid or non existing BIOS information however would be rejected by the Add Module function.

Example: Create and add a BIOS boot logo module.

1. Initiate the module creation process by clicking the 'Create Module' button and select a valid JPEG data file.



BIOS Module Modification

Standard BIOS Version: BV97R111

OEM BIOS Version: --------

Current BIOS Modules:

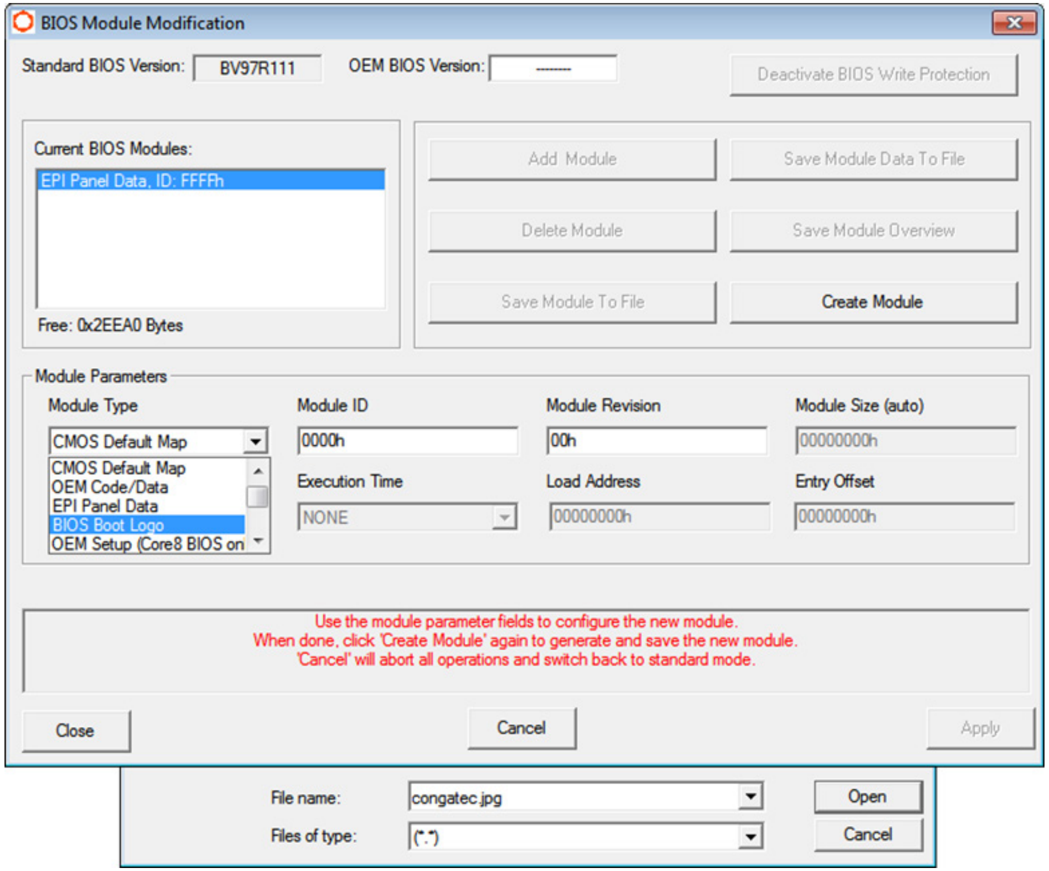
EPI Panel Data, ID: FFFFh

Free: 0x2EEA0 Bytes

Module Parameters

Module Type	Module ID	Module Revision	Module Size (auto)
EPI Panel Data	FFFFh	01h	00001134h
Load Time	**Execution Time**	**Load Address**	**Entry Offset**
NONE	NONE	FFFFFFFFh	00000000h

2. Select the 'BIOS Boot Logo' module type, ensure that module ID is set to zero, and enter a module revision if desired. Afterwards, click 'Create Module' button again to generate and save the module.



Standard BIOS Version: BV97R111

OEM BIOS Version: --------

Current BIOS Modules:
EPI Panel Data, ID: FFFFh

Free: 0x2EEA0 Bytes

Module Type: CMOS Default Map
- CMOS Default Map
- OEM Code/Data
- EPI Panel Data
- BIOS Boot Logo
- OEM Setup (Core8 BIOS on

Module ID: 0000h

Module Revision: 00h

Module Size (auto): 00000000h

Execution Time: NONE

Load Address: 00000000h

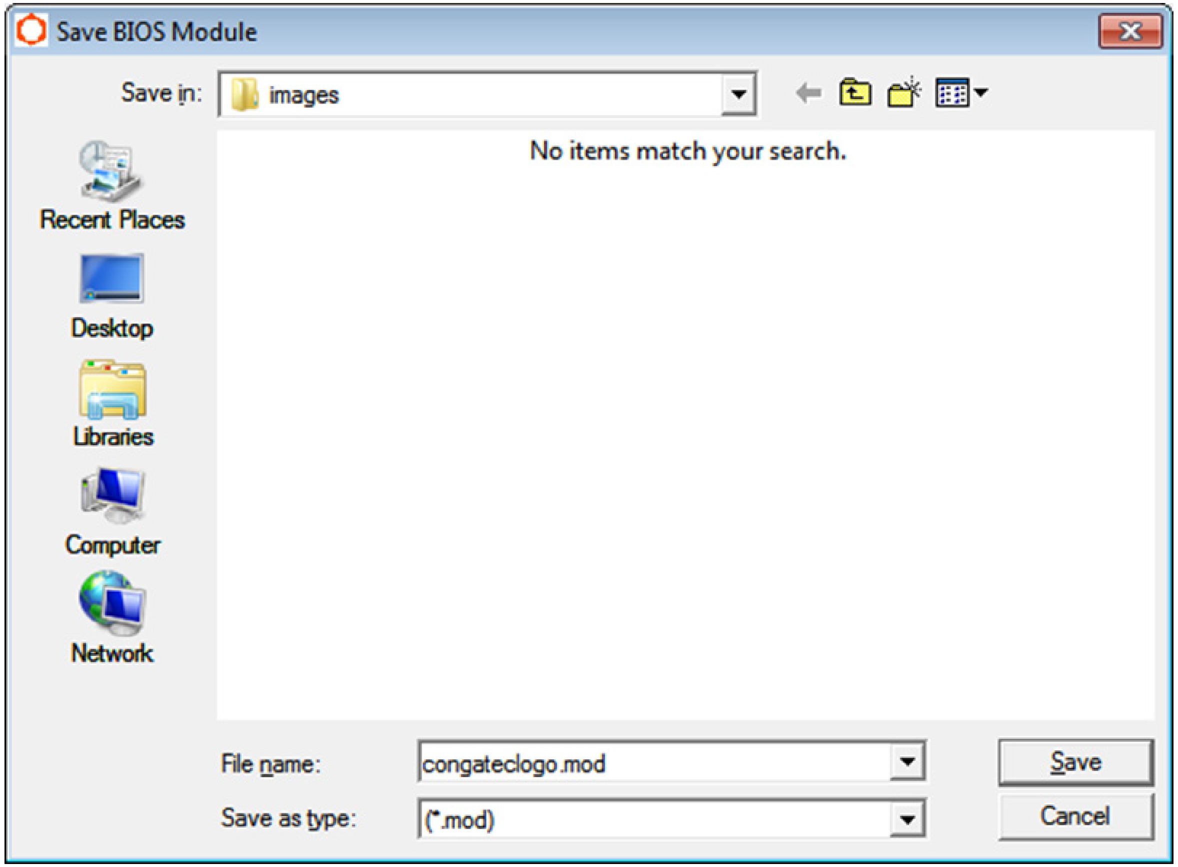
Entry Offset: 00000000h

Use the module parameter fields to configure the new module.
When done, click 'Create Module' again to generate and save the new module.
'Cancel' will abort all operations and switch back to standard mode.

File name: congatec.jpg

Files of type: (*.*)

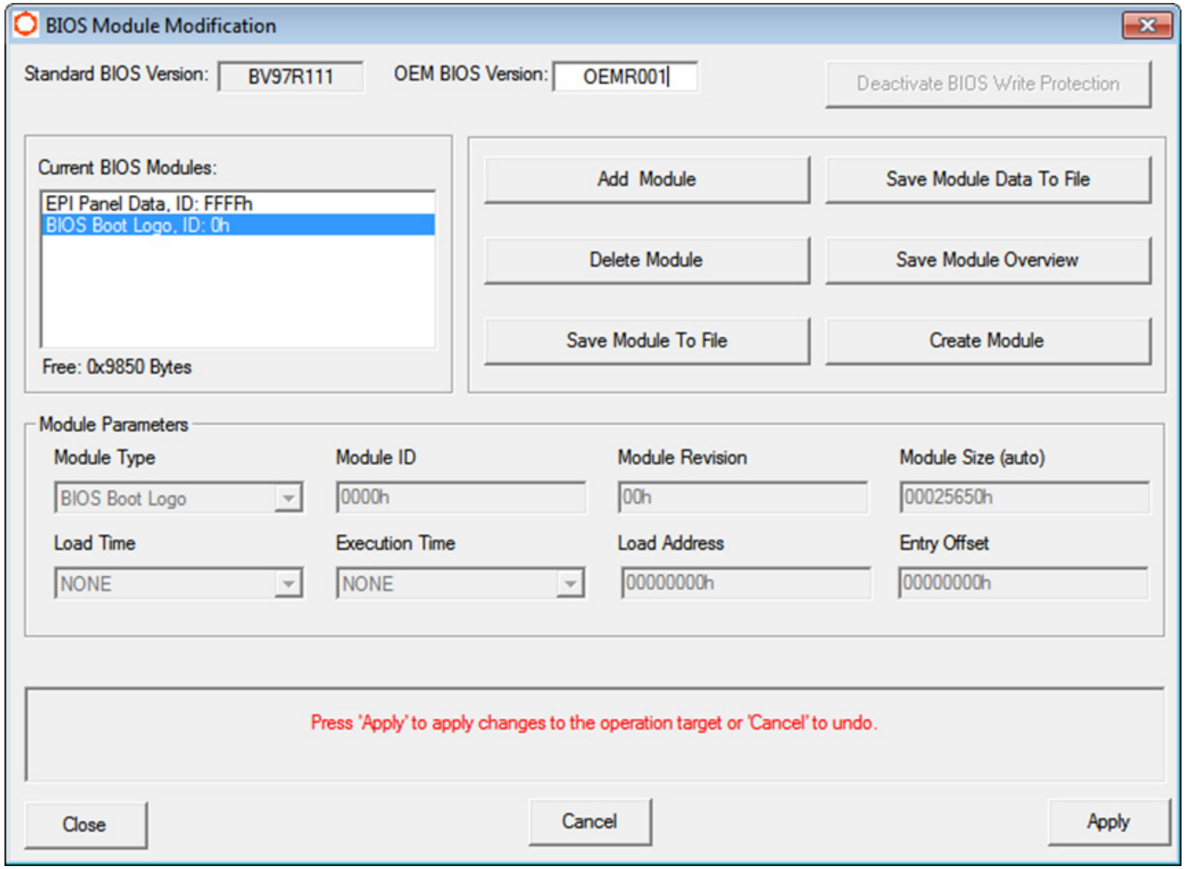
3. Click ‘Add Module’ and select the recently created boot logo module file. The logo module should now be displayed in the ‘Current congatec BIOS Modules’ window. Select it and verify that the module parameters are correct.



File name: congateclogo.mod

Save as type: (*.mod)

4. Set a defined OEM version in the OEM BIOS Version field and click the 'Apply' button to update the operating target.



BIOS Module Modification

Standard BIOS Version: BV97R111

OEM BIOS Version: OEMR001

Current BIOS Modules:

EPI Panel Data, ID: FFFFh
BIOS Boot Logo, ID: 0h

Free: 0x9850 Bytes

Module Parameters

Module Type	Module ID	Module Revision	Module Size (auto)
BIOS Boot Logo	0000h	00h	00025650h

Load Time	Execution Time	Load Address	Entry Offset
NONE	NONE	00000000h	00000000h

Press 'Apply' to apply changes to the operation target or 'Cancel' to undo.

3.5.4 Command Line Versions

Function module selector:

```
MODULE
```

Syntax:

```
CGUTLCMD MODULE /OT:[target]  /[command]  /OF:<output file> /IF:<input file> [parms]
```

Syntax description:

/OT:	Specify the operating target.
BOARD	All actions result in direct hardware accesses to the respective congatec board. All other strings are interpreted as name of the BIOS file to be modified.
parms	Command parameters, if required (see below).
/IF:	Specify the input data file (depends on command).
/OF:	Specify the output data file (depends on command).

Commands:

/SAVE	Find specified module and save it to the output data file.
/DSAVE	Find specified module and save its data block.
/CMP	Find specified BIOS module and compare it with the module input file.
/DCMP	Find specified BIOS module and compare module data with the data part of the module input file.
/DEL	Find specified module and delete it.
/ADD	Add a new BIOS module specified with the input file parameter to the operating target.
/LIST	Generate a list of all congatec BIOS modules found on the operating target and display it.
/SLIST	Generate a list of all congatec BIOS modules found on the operating target and save it to the output data file.
/CREATE	Create a new congatec BIOS module using input file data and store the result in the specified output file.
/INFO	Display the OEM BIOS version (if assigned) and information about the free space left in the module storage area.
/OEM:xxxxxxxx	Assign an OEM BIOS version (max. eight characters). This OEM BIOS version will be displayed in addition to the original congatec BIOS version in BIOS setup and during POST.

congatec BIOS module parameters:

/T:	BIOS module type (BYTE).
/ID:	BIOS module ID (WORD). Default: 0
/R:	BIOS module revision (BYTE). Default: 0
/LA:	BIOS module physical load address (DWORD, usercode only). Default: 0 Special addresses: 00000000: Load module at any free upper memory block address. FFFFFFFE: Load module at any free conventional memory address. FFFFFFFF: Load module at any free extended memory address.
/LT:	BIOS module load time (BYTE, user code only).Default: 0
/ET:	BIOS module execution time (BYTE, user code only).Default: 0
/O:	BIOS module entry offset (DWORD, user code only).Default: 0

congatec BIOS module types:

1h	CMOS Backup Map Module
2h	CMOS Default Map Module
3h	OEM Code/Data Module
5h	EPI Panel Data Module
6h	BIOS Boot Logo Module
8h	OEM Setup Module (Core8 BIOS only!)
9h	Fixed CMOS Map Module
Bh	OEM Video Mode Module
Ch	OEM HDA Verb Table Module
Dh	OEM SLIC Table Module
Eh	OEM SLP 1.0 Module
Fh	Standard VBIOS Module
10h	OEM VBIOS Module
11h	POST Logo Left Module
12h	POST Logo Right Module
13h	UEFI FW Volume Module
14h	OA 3.0 Module
15h	OEM Setup Menu Control Module
16h	OEM SMBIOS Data Module
E0h	Pad Module

congatec execution/load time selectors:

0	NONE	Do not load/execute the OEM module.
2	BEFORE_CMOS_TEST	Load/execute before CMOS test.
3	BEFORE_VIDEO_INIT	Load/execute before video BIOS initialization.
4	AFTER_VIDEO_INIT	Load/execute after video BIOS initialization.
5	BEFORE_OPROM_SCAN	Load/execute before option ROM scan.
6	AFTER_OPROM_SCAN	Load/execute after option ROM scan.
7	BEFORE_SETUP	Load/execute on setup screen start.
8	SETUP_EXTENSION	Load/execute as setup screen extension.
9	BEFORE_BOOT	Load/execute at end of BIOS POST.

All numeric parameters are interpreted as hexadecimals.

Note

The /DEL, /SAVE and /DSAVE commands require that a module type is specified. If there are more modules of this type, the first module found will be chosen. For a unique identification, the module ID parameter has to be passed as well.

Anytime a BIOS module is added to or deleted from a standard congatec BIOS, it will result in the BIOS displaying an add-on OEM version information string to the BIOS boot screen and in the BIOS setup menu. If no defined OEM version is assigned using the /OEM: command, the OEM version is set to 'UNKNOWN'. To avoid this, it is highly recommended to always set a defined OEM version string when modifying the BIOS and use that same OEM version string to name the OEM BIOS version file.

Examples:

1. Delete a BIOS boot logo module in 'Board' mode.
```
CGUTLCMD MODULE /OT:BOARD /DEL /T:6
```
2. Save a current setup settings module to a file in 'Board' mode.
```
CGUTLCMD MODULE /OT:BOARD /SAVE /OF:BACKUP.MOD /T:1
```
3. Create a default setup settings module out of the current setup settings module.
```
CGUTLCMD MODULE /OT:BOARD /CREATE /IF:BACKUP.MOD /OF:DEFAULT.MOD /T:2 /ID:0 /R:1
```
4. Add the default setup settings module to a BIOS file in 'BIOS File' mode.
```
CGUTLCMD MODULE /OT:BV97R111.BIN /ADD /IF:DEFAULT.MOD
```
5. Delete OEM module with module ID 2.
```
CGUTLCMD MODULE /OT:BOARD /DEL /T:3 /ID:2
```

6. Assign a defined OEM version to the modified BIOS.

```
CGUTLCMD MODULE /OT:BOARD /OEM:OEMVR001
```

or in BIOS file mode:

```
CGUTLCMD MODULE /OT:BV97R111.BIN /OEM:OEMVR001
```

3.6 Board and BIOS Information Module

3.6.1 General Description

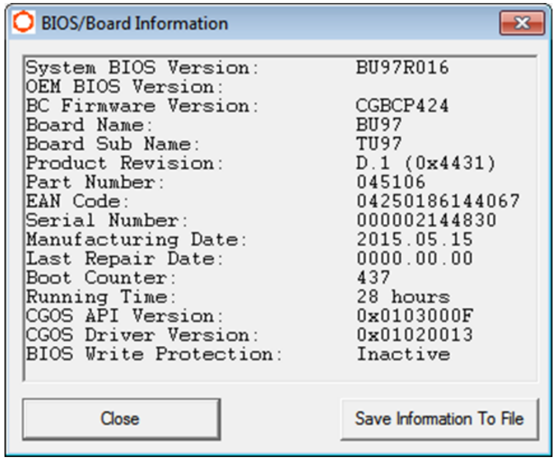
This module offers an easy way to gather relevant information about a certain congatec board and BIOS. The information is meant to be used by customers during their own setup or manufacturing process to identify a congatec board or BIOS, or to be passed to congatec when contacting the support team.

The following information can be derived from a congatec board:

- System BIOS Version
- OEM BIOS Version
- Board Controller Firmware Version
- Board Name
- Board Sub Name
- Product Revision
- Part Number
- EAN Code
- Serial Number
- Manufacturing Date
- Last Repair Date
- Boot Counter
- Running Time
- CGOS API Version
- CGOS Driver Version
- BIOS Update And Write Protection State

The information module can also be used in ‘BIOS File’ mode, e.g. to analyze a congatec BIOS file. However, only the system and OEM BIOS version can be derived from this BIOS file.

3.6.2 Windows GUI Version



```
System BIOS Version:          BU97R016
OEM BIOS Version:
BC Firmware Version:          CGBCP424
Board Name:                   BU97
Board Sub Name:               TU97
Product Revision:             D.1 (0x4431)
Part Number:                  045106
EAN Code:                     04250186144067
Serial Number:                000002144830
Manufacturing Date:           2015.05.15
Last Repair Date:             0000.00.00
Boot Counter:                 437
Running Time:                 28 hours
CGOS API Version:             0x0103000F
CGOS Driver Version:          0x01020013
BIOS Write Protection:        Inactive
```

When started, the Windows GUI version of the Board And BIOS Information module automatically gathers and displays all available board information. This information can also be saved to a text file.

3.6.3 Command Line Versions

Function module selector:

```
CGINFO
```

Syntax:

```
CGUTLCMD CGINFO /OT:[target]  /[command]  [parm] [options]
```

Syntax description:

/OT:	Specify the operating target.
BOARD:	All actions result in direct hardware accesses to the respective congatec board. All other strings are interpreted as name of the BIOS file to be analyzed.
parm	Command parameters, if required (e.g. input or output file name).
options	Information selection option(s). One or more options to select the information that should be returned by the DUMP or SAVE command (see below).

Commands:

/DUMP	Display selected information on screen.
/SAVE	Save selected information to file.

/BFCHK	Check whether the operating target system and OEM BIOS versions match the versions of the specified BIOS file.
/FWCHK	Check whether operating target board controller firmware version matches the version of the specified firmware file.

Information selection options:

/SILENT	Information is displayed or saved without description text (e.g.: ’X945R111’ instead of ‘System BIOS Version: X945R111’).
/BIOS	Return system and OEM BIOS version.
/BCFW	Return board controller firmware version.
/CGOS	Return CGOS interface and driver version.
/BCNT	Return boot counter.
/RTIM	Return running time.
/MANU	Return CPU-board manufacturing data.
/BUP	Return state of the ’BIOS Update And Write Protection’#

If no selection options are passed, the complete information list will be displayed or saved.

Examples:

1. Display BIOS versions and boot counter with description text.

```
CGUTLCMD CGINFO /OT:BOARD /DUMP /BIOS /BCNT
```

Possible output:

```
System BIOS Version:         BV97R111
OEM BIOS Version:
Boot Counter:                571
```

2. Display board manufacturing information with description text.

```
CGUTLCMD CGINFO /OT:BOARD /DUMP /MANU
```

Possible output:

```
Board Name:                  BV97
Board Sub Name:              TU97
Product Revision:            D.1 (0x4431)
Part Number:                 045106
EAN Code:                    04250186144067
Manufacturing Date:          2015.05.15
Last Repair Date:            0000.00.00
```

3.7 BIOS Setup Configuration Module

3.7.1 General Description

The BIOS Setup Configuration option enables customers to modify the standard, build time defined BIOS setup menu of a congatec BIOS. This is achieved by launching the congatec Menu Layout File Editor, which in turn allows to create customized OEM Setup Menu Control Modules. These modules, once added to the target BIOS, allow the user to show, hide or gray-out a given setup node and change its title and help text.

OEM setup modification requires a congatec embedded BIOS based on AMI's AptioV UEFI firmware implementation. Only BIOS releases after mid of 2016 might have the support built-in. One can check if the BIOS supports OEM setup modification by looking at the Save & Exit setup submenu. There must be an option for saving the current Setup Layout file using the item Generate Menu Layout File. See picture below.

It is not possible to change the default settings or change the options of a particular setup node. In case you want to do this, please refer to the congatec AN8_Create_OEM_Default_Map to learn how to change the default settings of a congatec embedded BIOS.

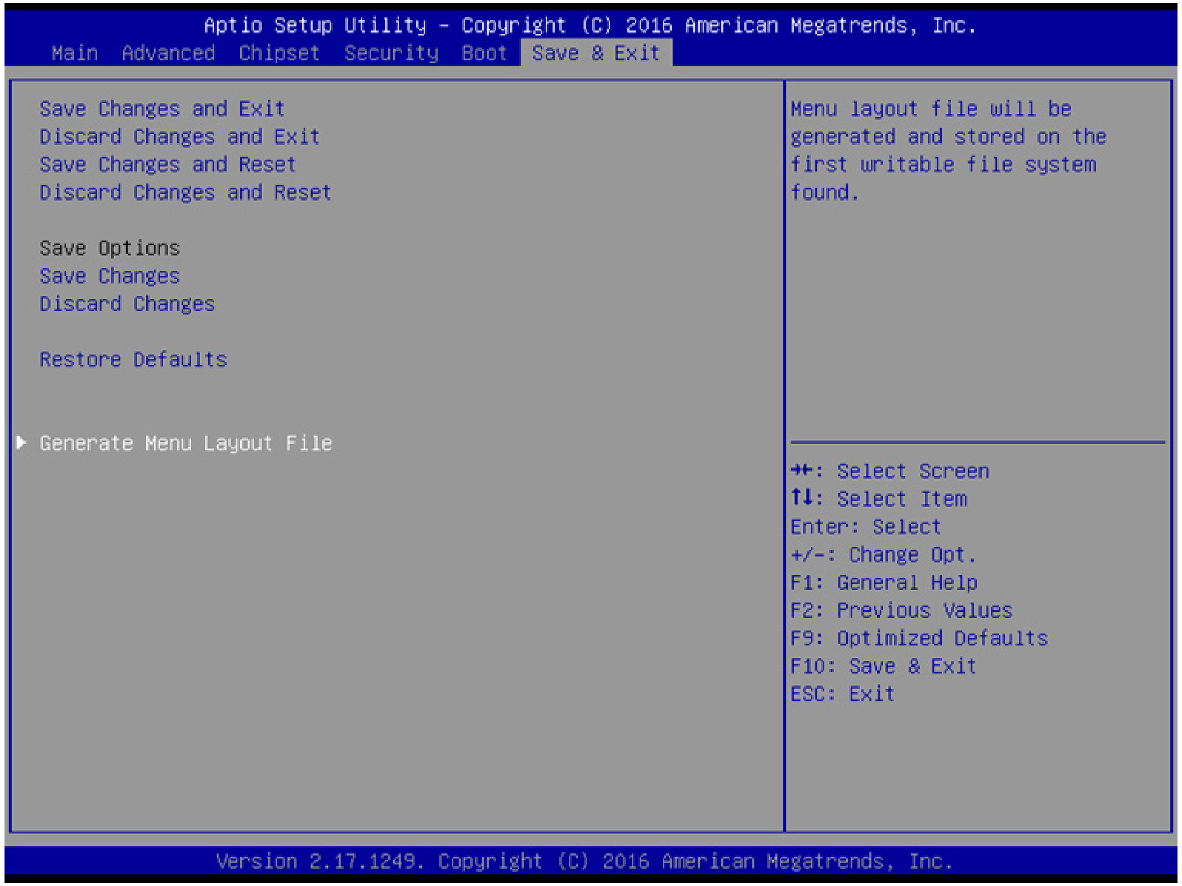
The congatec application note AN35_BIOS_Setup_Configuration describes in detail how to use the Windows GUI version of the congatec System Utility and the congatec Menu Layout File Editor tool (CgMlfEditor) to create and apply OEM Setup Menu Control Modules for setup menu modification.

The sections below provide a brief overview.

3.7.2 Creating a Menu Layout File (MLF)

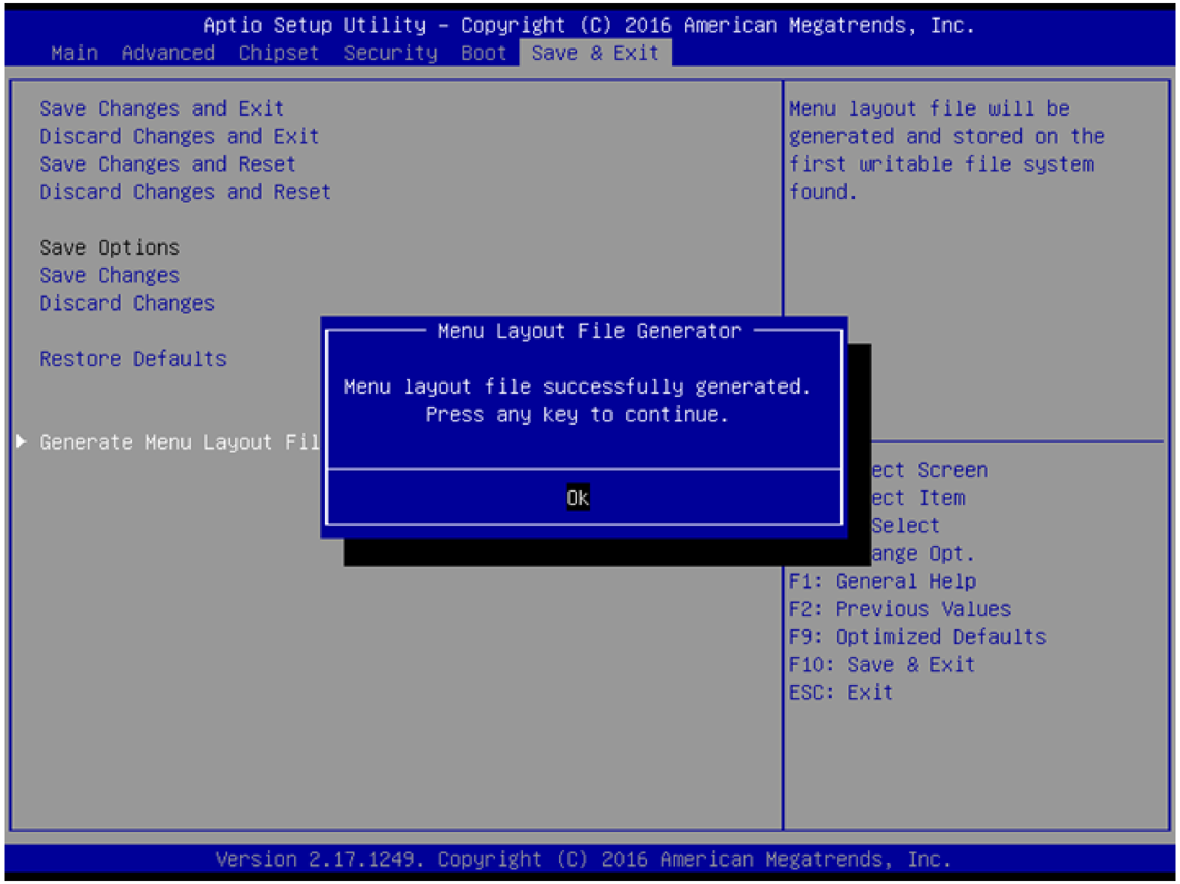
In order to edit your setup menu layout, a menu layout file containing your current BIOS layout has to be generated. It will be stored on the first writable file system found, e.g. a plugged in USB drive. The filename consists of the current BIOS versionand has the ending ".mlf".

1. Select "Generate Menu Layout File" in the "Save & Exit" tab of your BIOS setup screen.



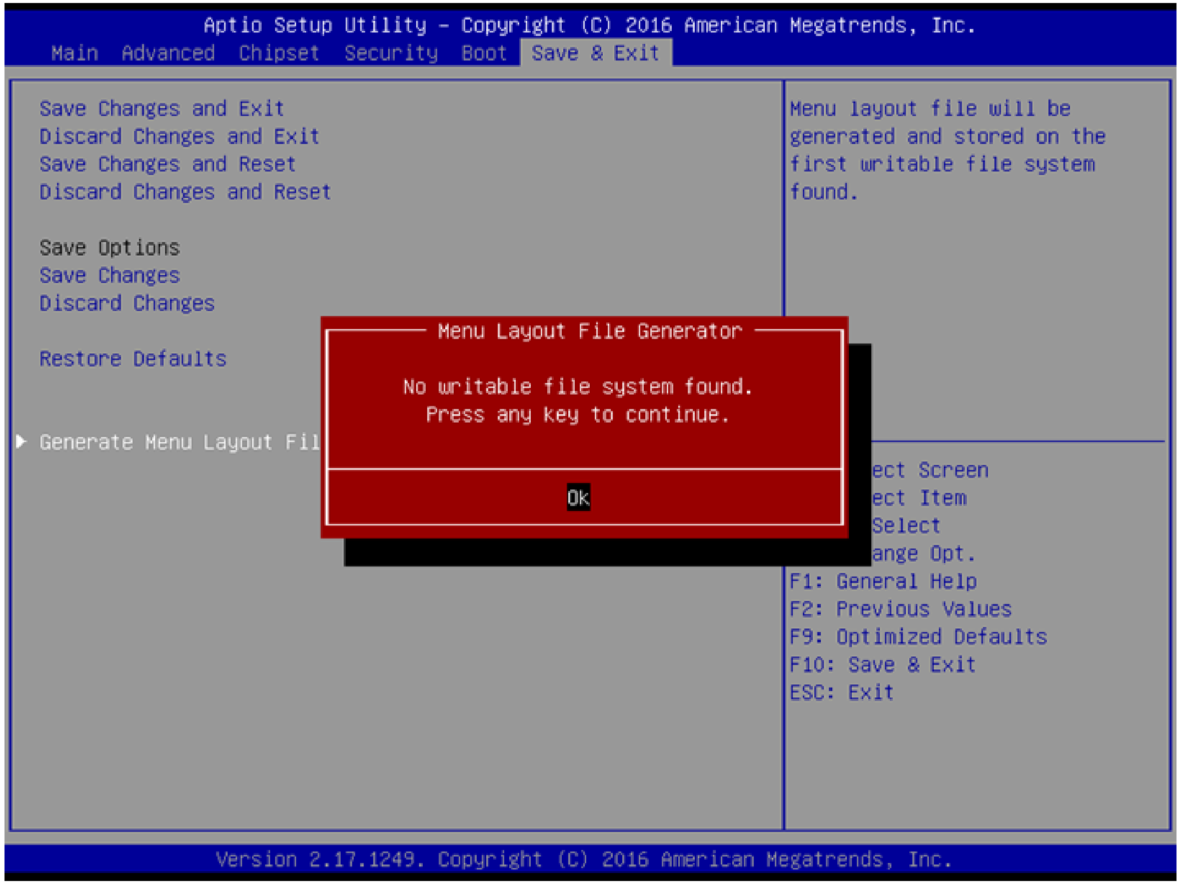
```
        Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

  Save Changes and Exit                                 Menu layout file will be
  Discard Changes and Exit                              generated and stored on the
  Save Changes and Reset                                first writable file system
  Discard Changes and Reset                             found.

  Save Options
  Save Changes
  Discard Changes

  Restore Defaults


▶ Generate Menu Layout File
                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F9: Optimized Defaults
                                                        F10: Save & Exit
                                                        ESC: Exit

          Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.
```

2. A confirmation window appears, indicating that the file was successfully generated.



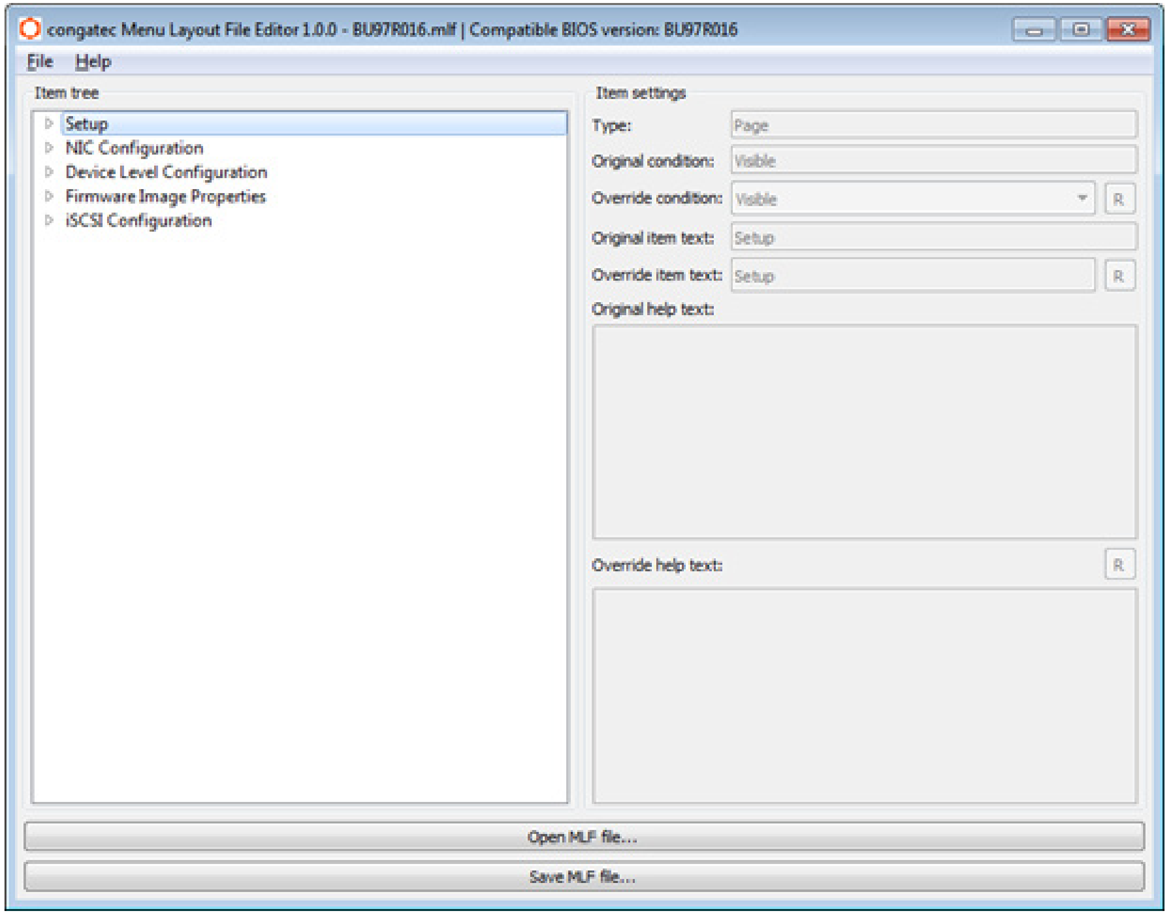
```
           Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

  Save Changes and Exit                                  Menu layout file will be
  Discard Changes and Exit                               generated and stored on the
  Save Changes and Reset                                 first writable file system
  Discard Changes and Reset                              found.

  Save Options
  Save Changes
  Discard Changes
                           Menu Layout File Generator
  Restore Defaults
                         Menu layout file successfully generated.
                                Press any key to continue.
▶ Generate Menu Layout Fil                                      ect Screen
                                         Ok                     ect Item
                                                                Select
                                                                ange Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F9: Optimized Defaults
                                                         F10: Save & Exit
                                                         ESC: Exit

          Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.
```

3. In case of an error (e.g. if you have no appropriate storage medium attached), a corresponding error message will be displayed.



```
            Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
    Main  Advanced  Chipset  Security  Boot  Save & Exit

  Save Changes and Exit                                     Menu layout file will be
  Discard Changes and Exit                                  generated and stored on the
  Save Changes and Reset                                    first writable file system
  Discard Changes and Reset                                 found.

  Save Options
  Save Changes
  Discard Changes
                          Menu Layout File Generator
  Restore Defaults
                         No writable file system found.
                          Press any key to continue.
▶ Generate Menu Layout Fil
                                                                   ect Screen
                                       Ok                          ect Item
                                                                   Select
                                                                   ange Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F9: Optimized Defaults
                                                            F10: Save & Exit
                                                            ESC: Exit

             Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.
```

3.7.3 Using congatec Menu Layout File Editor



congatec Menu Layout File Editor 1.0.0 - BU97R016.mlf | Compatible BIOS version: BU97R016

Type: Page

Original condition: Visible

Override condition: Visible

Original item text: Setup

Override item text: Setup

Original help text:

Override help text:

Menu layout files can be opened or saved by using the ‘Open/Save MLF file...’ buttons. After a .mlf file is opened, the file name and the compatible BIOS version are shown in the window title. Any changes applied by the user will be indicated by adding green background color to the corresponding item. After saving a .mlf file, you will be asked whether to open the new file and update the tree view as well as the ‘original’ fields to reflect the changes or to keep the previous view.

Item tree

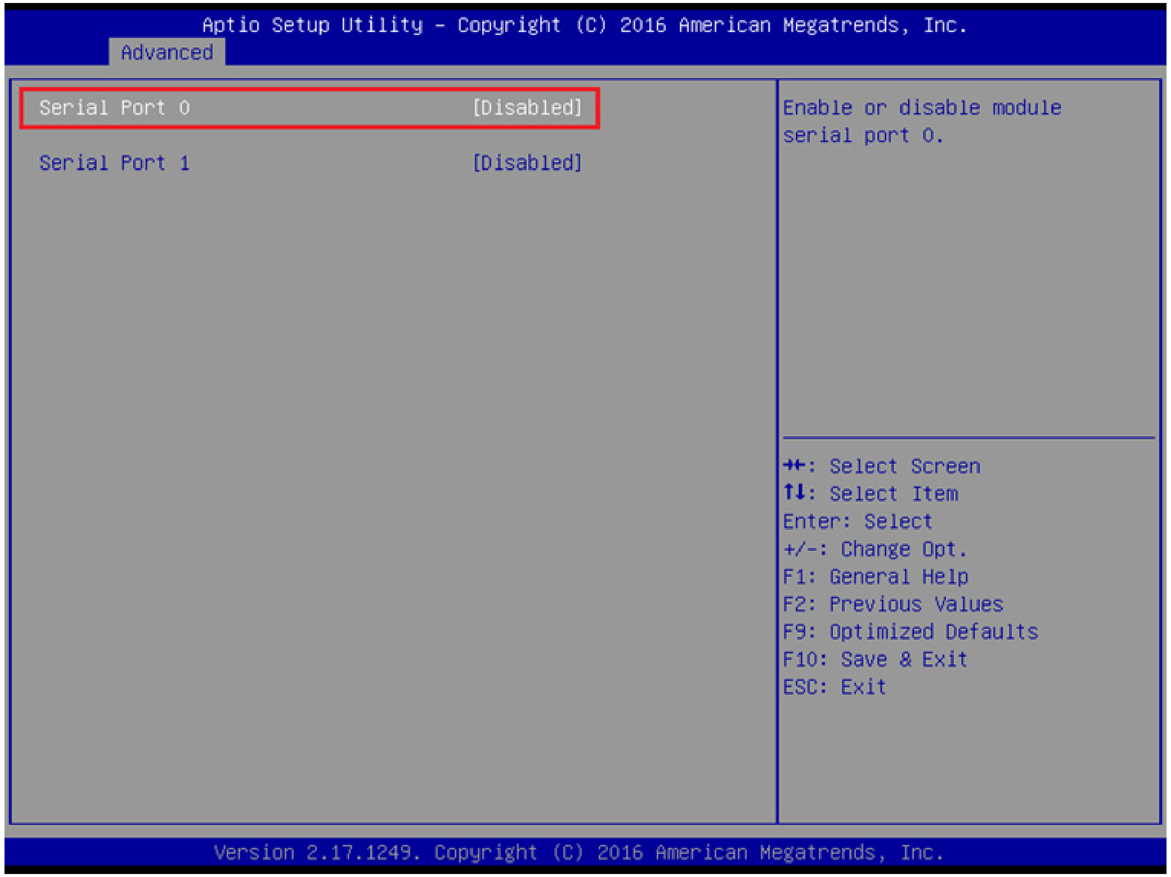
This section contains the setup menu and configuration items of the opened .mlf file sorted in a tree view layout.

Item Settings

Changes for each selected item in the item tree can be applied using the available 'override' fields while the current settings will be displayed in the 'original' fields for reference. The default selection or text for each 'override' field can be restored to the 'original' contents using the "R" button beneath the according fields.

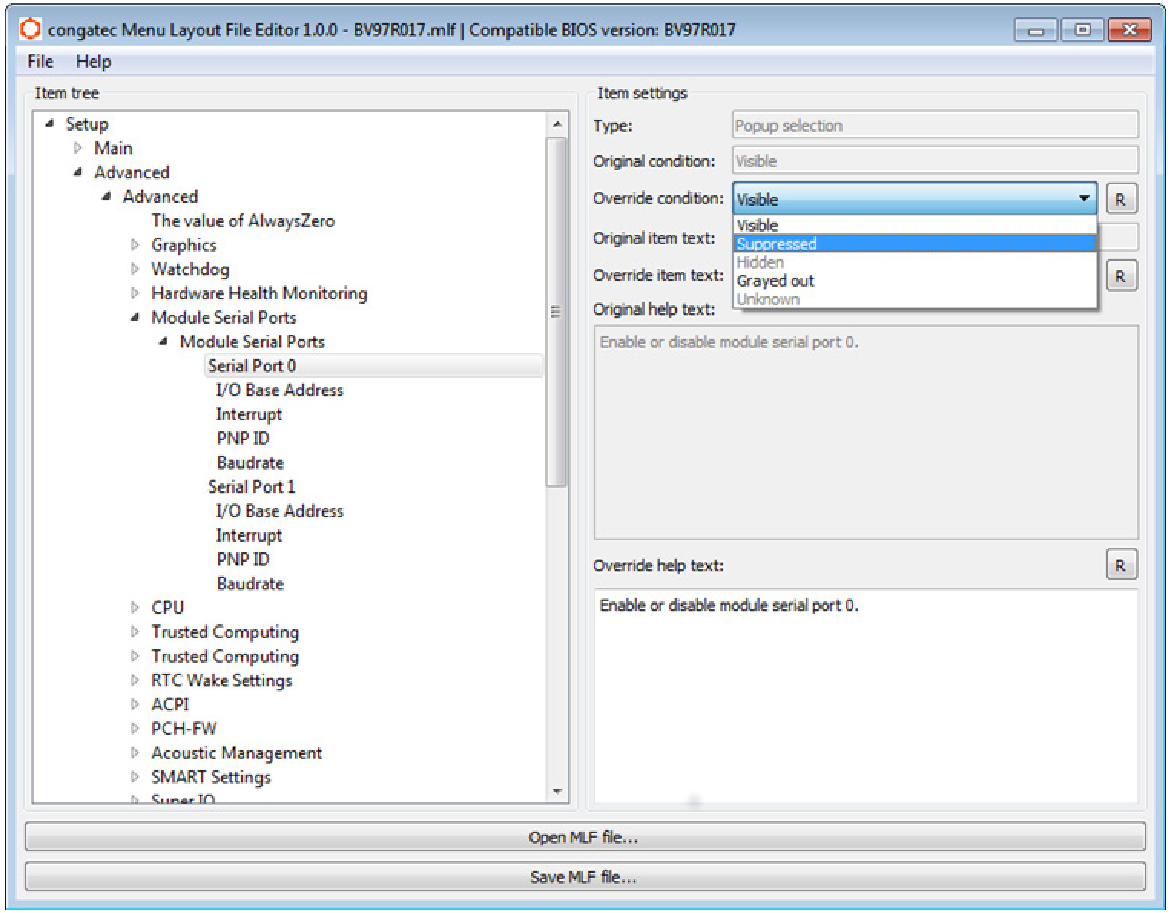
Example

In order to demonstrate the functionality of the congatec Menu Layout File Editor, it is assumed that the user wants to hide the settings for 'Serial Port 0' from Advanced / Module Serial Ports.



```
          Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
      Advanced

 Serial Port 0                      [Disabled]   Enable or disable module
                                                 serial port 0.
 Serial Port 1                      [Disabled]

                                                 →←: Select Screen
                                                 ↑↓: Select Item
                                                 Enter: Select
                                                 +/-: Change Opt.
                                                 F1: General Help
                                                 F2: Previous Values
                                                 F9: Optimized Defaults
                                                 F10: Save & Exit
                                                 ESC: Exit

           Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.
```

1. Expand the item tree view using the node arrows left of each item. Collapsed node arrows are filled white, expanded node arrows are filled black. The content is indented hierarchically, showing the setup menu tabs at highest level. Navigate to 'Advanced' / 'Module Serial Ports' and choose 'Serial Port 0' entry by clicking on it. Change the visibility in the 'Override condition' drop down menu to 'Suppressed'.



congatec Menu Layout File Editor 1.0.0 - BV97R017.mlf | Compatible BIOS version: BV97R017

Item settings

Type: Popup selection

Original condition: Visible

Override condition: Visible

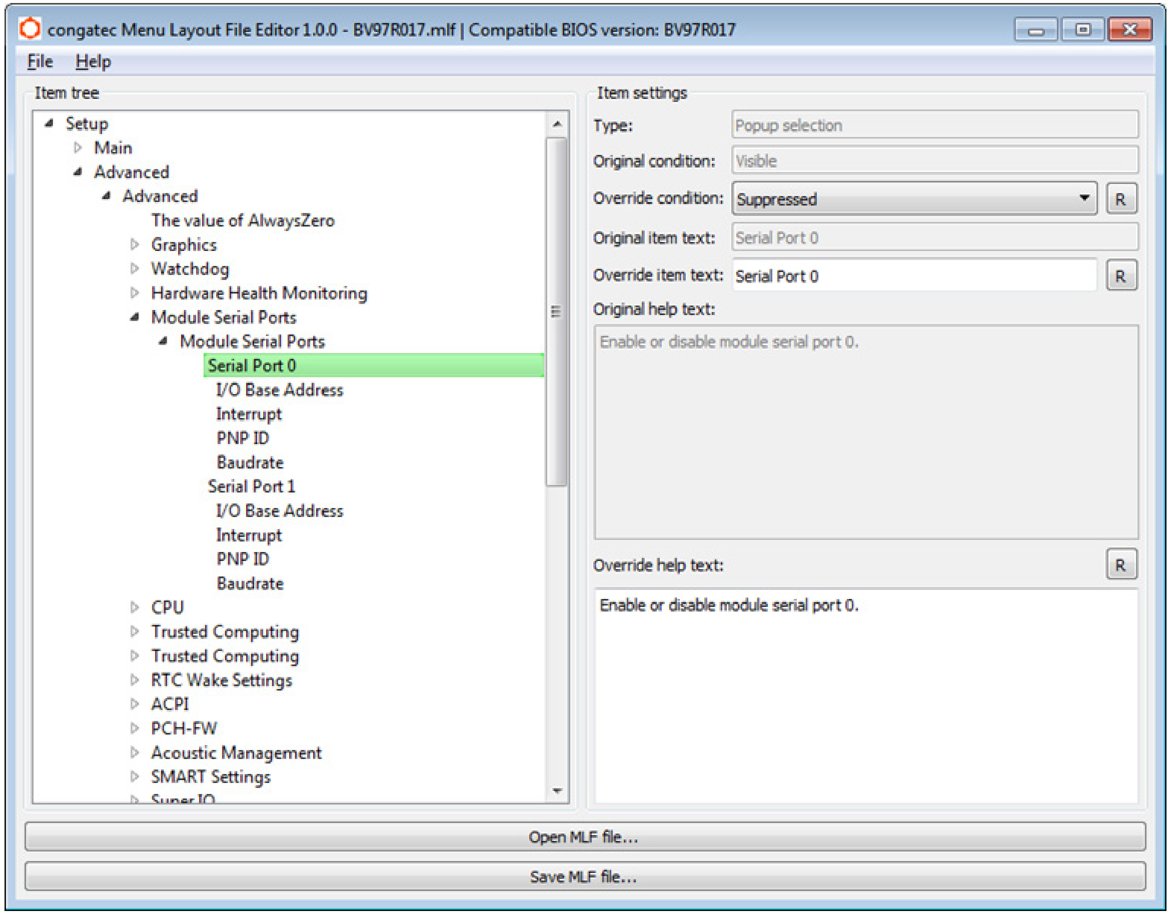
Original item text:

Override item text:

Original help text: Enable or disable module serial port 0.

Override help text: Enable or disable module serial port 0.

2. The item background color is changed to green, indicating that changes were made.



Type: Popup selection

Original condition: Visible

Override condition: Suppressed

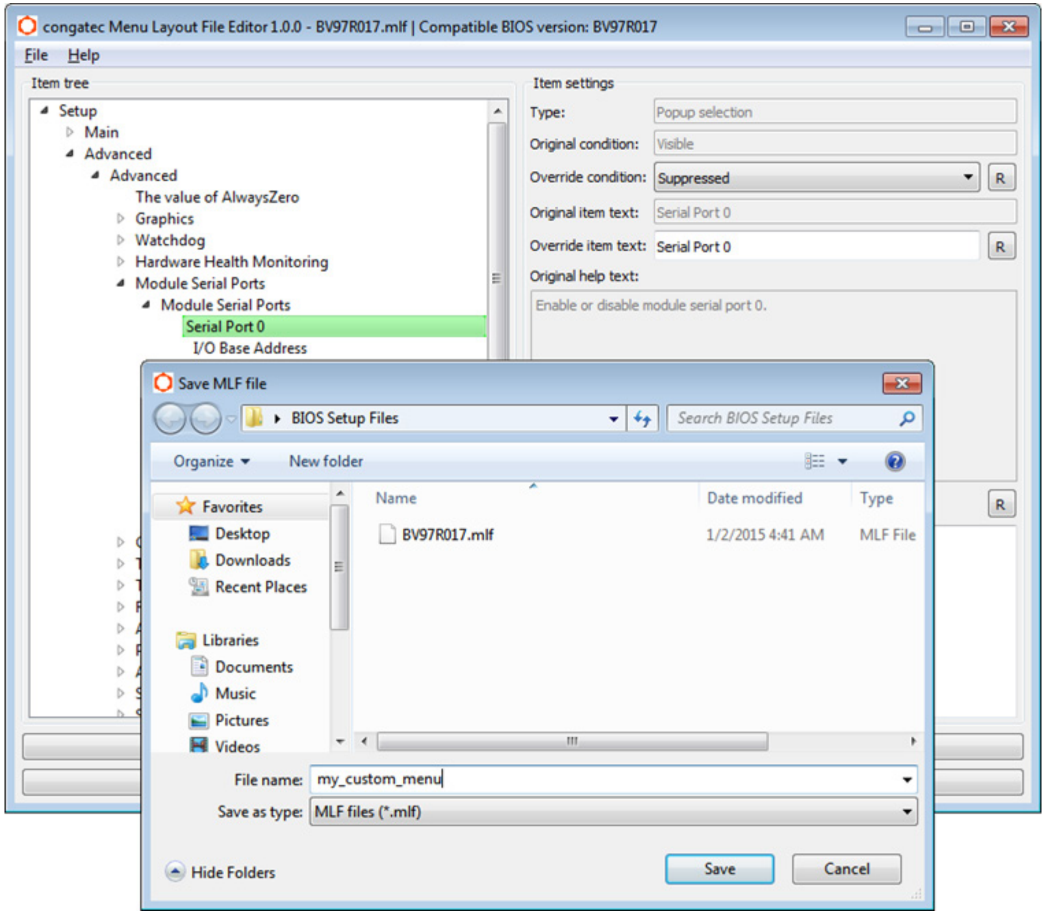
Original item text: Serial Port 0

Override item text: Serial Port 0

Original help text: Enable or disable module serial port 0.

Override help text: Enable or disable module serial port 0.

3. Save the customized menu layout to a new file (e.g. “my_custom_menu.mlf”).



congatec Menu Layout File Editor 1.0.0 - BV97R017.mlf | Compatible BIOS version: BV97R017

Item settings

Type: Popup selection

Original condition: Visible

Override condition: Suppressed

Original item text: Serial Port 0

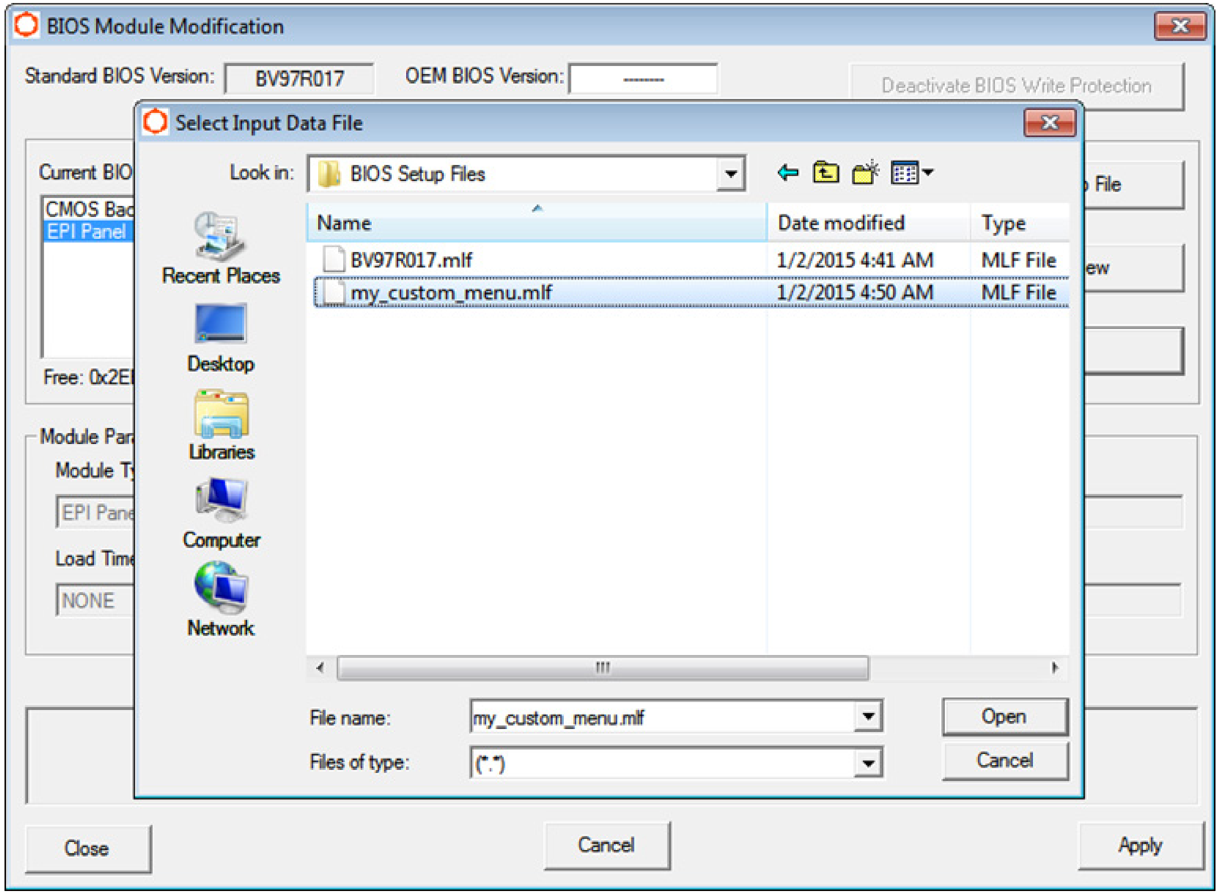
Override item text: Serial Port 0

Original help text: Enable or disable module serial port 0.

File name: my_custom_menu

Save as type: MLF files (*.mlf)

4. Close the congatec Menu Layout File Editor and open the BIOS Module Modification Module. Select 'Create Module' and choose your .mlf file as input file.



Standard BIOS Version: BV97R017

OEM BIOS Version: --------

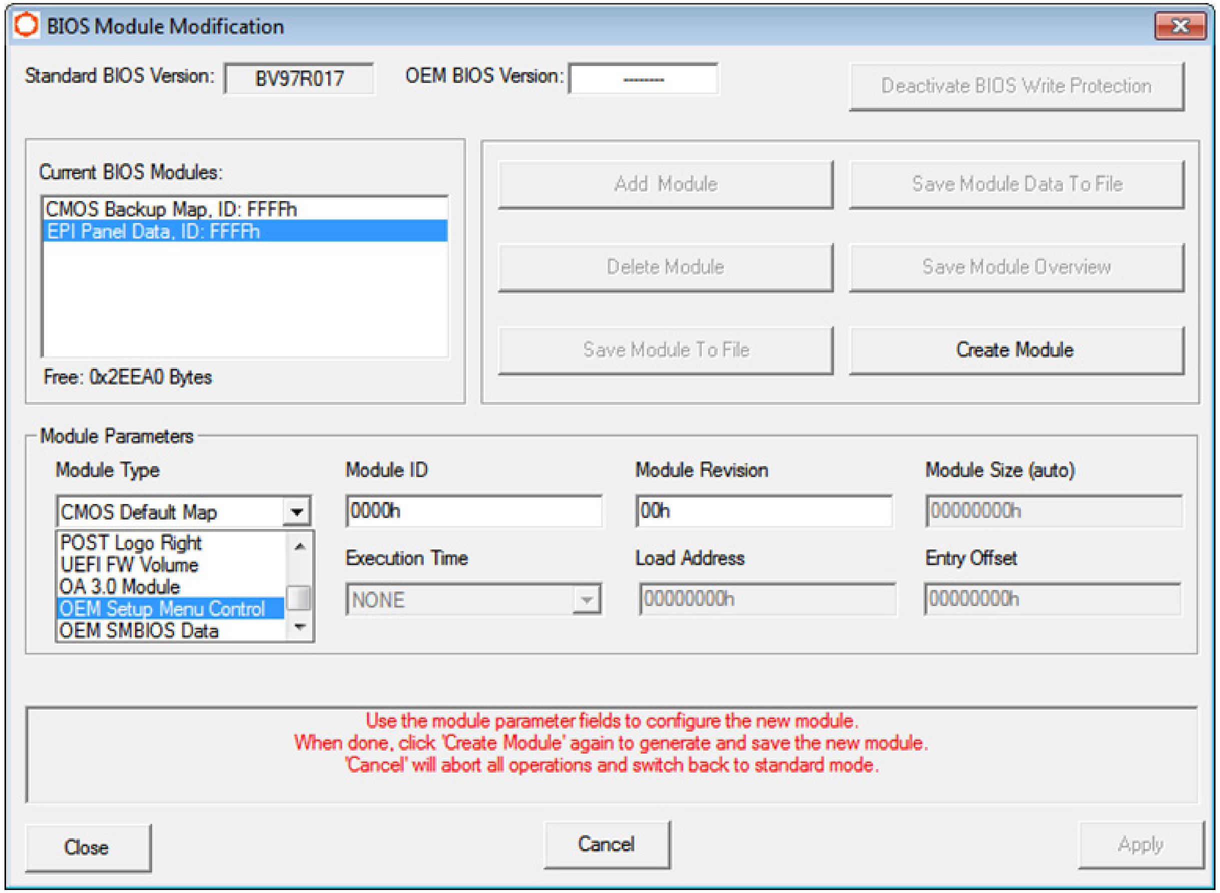
Look in: BIOS Setup Files

Name	Date modified	Type
BV97R017.mlf	1/2/2015 4:41 AM	MLF File
my_custom_menu.mlf	1/2/2015 4:50 AM	MLF File

File name: my_custom_menu.mlf

Files of type: (*.*)

5. Select "OEM Setup Menu Control" as Module Type.



Standard BIOS Version: BV97R017

OEM BIOS Version: --------

Current BIOS Modules:

- CMOS Backup Map, ID: FFFFh
- EPI Panel Data, ID: FFFFh

Free: 0x2EEA0 Bytes

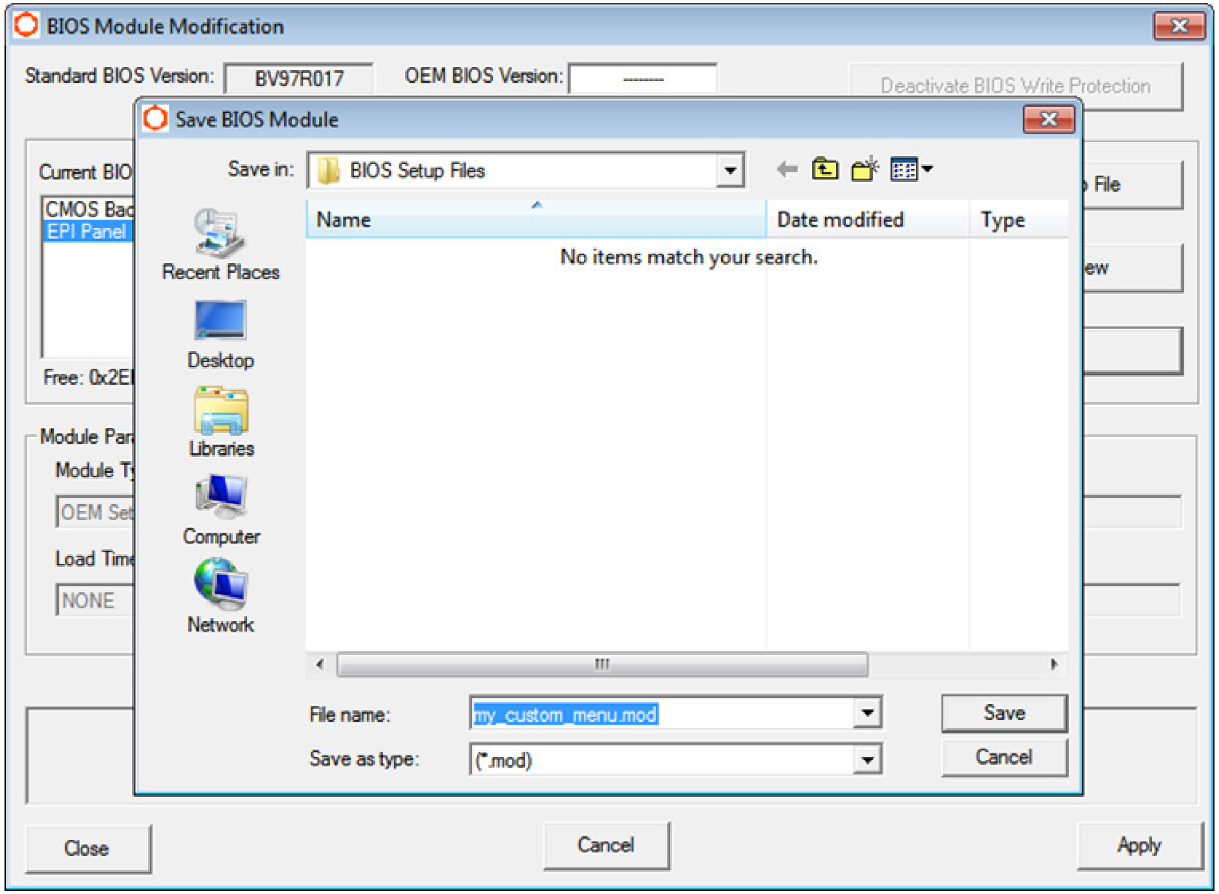
Module Parameters

Module Type	Module ID	Module Revision	Module Size (auto)
CMOS Default Map	0000h	00h	00000000h
	Execution Time	**Load Address**	**Entry Offset**
	NONE	00000000h	00000000h

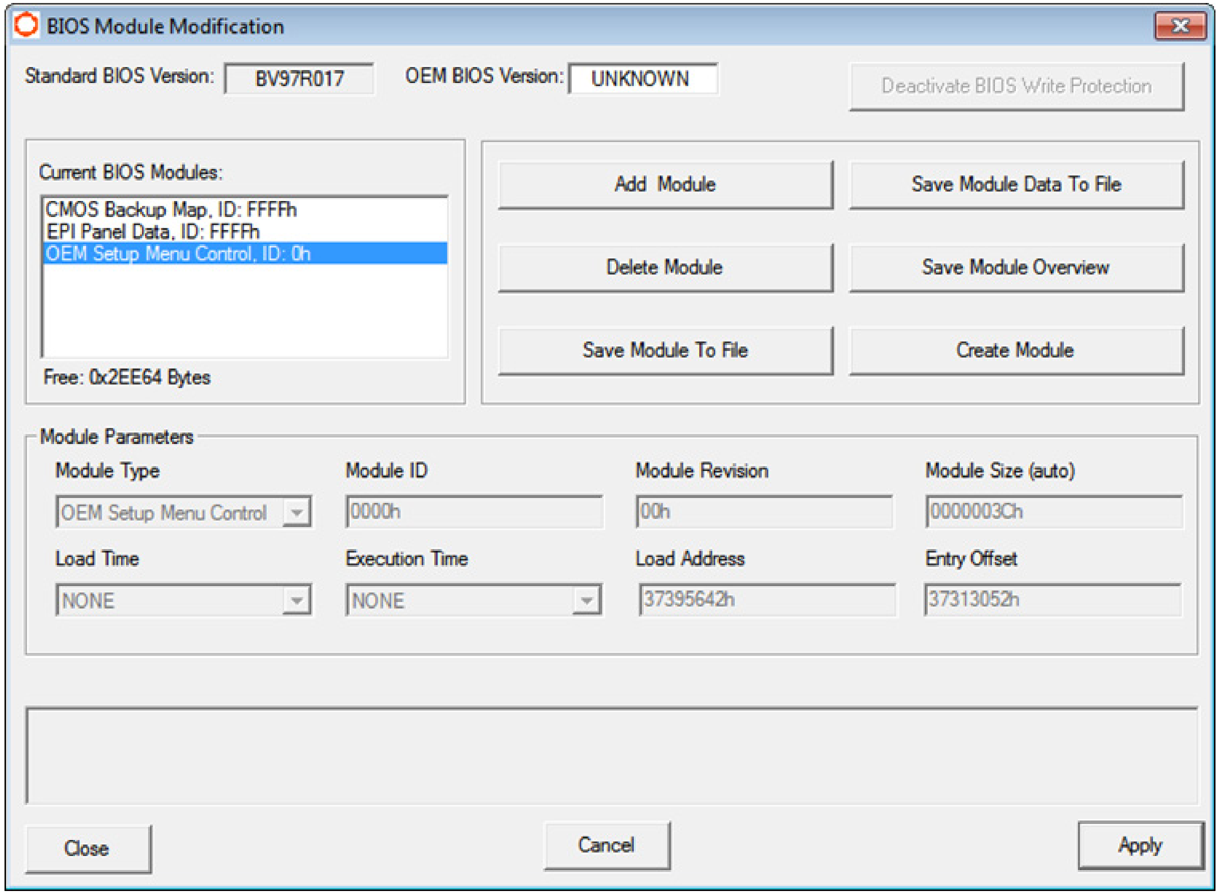
Module Type list: POST Logo Right, UEFI FW Volume, OA 3.0 Module, OEM Setup Menu Control, OEM SMBIOS Data

Use the module parameter fields to configure the new module.
When done, click 'Create Module' again to generate and save the new module.
'Cancel' will abort all operations and switch back to standard mode.

6. Click 'Create Module' again and save your module (e.g. "my_custom_menu.mod").



7. Choose 'Add Module' and select the module file you just created. The new module appears in 'Current BIOS Modules'. Click on 'Apply'.



BIOS Module Modification

Standard BIOS Version: BV97R017

OEM BIOS Version: UNKNOWN

Current BIOS Modules:

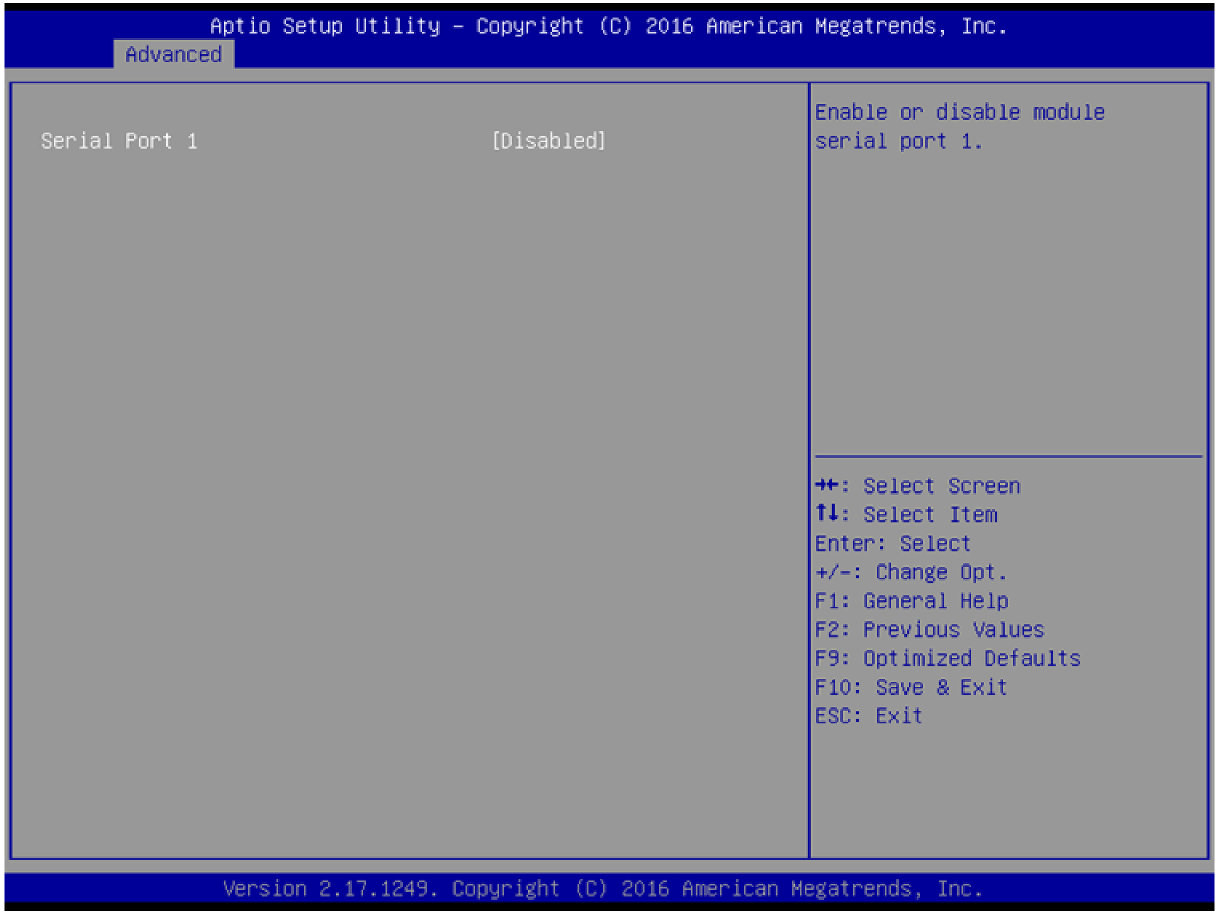
CMOS Backup Map, ID: FFFFh
EPI Panel Data, ID: FFFFh
OEM Setup Menu Control, ID: 0h

Free: 0x2EE64 Bytes

Module Parameters

Module Type	Module ID	Module Revision	Module Size (auto)
OEM Setup Menu Control	0000h	00h	0000003Ch
Load Time	**Execution Time**	**Load Address**	**Entry Offset**
NONE	NONE	37395642h	37313052h

8. After reboot, enter the setup menu. The entry for ‘Serial Port 0’ should be suppressed.



```
Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
Advanced

Serial Port 1                                [Disabled]
```

Enable or disable module serial port 1.

```
Version 2.17.1249. Copyright (C) 2016 American Megatrends, Inc.
```