Digital Signage Pluggable Module User’s Manual

OAMO OPS Module

The digital signage display pluggable standard (DPS) which enables a standard and easier integration of a digital signage computing system or a pluggable module into the display panel.

User Guide Version 1.1
Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>2011.06.02</td>
<td>First Version</td>
</tr>
<tr>
<td>1.1</td>
<td>2011.11.29</td>
<td>BIOS update</td>
</tr>
</tbody>
</table>

Package List

Before using this Digital Signage Evaluation Kit, please make sure that all the items listed below are present in your package:

1. Box (Packaging)
2. 1 x Pluggable Module
3. 1 x User’s Manual & Driver DVD

Make sure that all of the items listed above are present. Do not attempt to apply power to the system if there is damage to any of its components.
**FCC Statement**

This device complies with part 15 FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a class "a" digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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Warranty

We warrant that each of its products will be free from material and workmanship defects for a period of one year from the invoice date. If the customer discovers a defect, We will, at its option, repair or replace the defective product at no charge to the customer, provided it is returned during the warranty period of one year, with transportation charges prepaid. The returned product must be properly packaged in its original packaging to obtain warranty service.

If the serial number and the product shipping data differ by over 30 days, the in-warranty service will be made according to the shipping date. In the serial numbers the third and fourth two digits give the year of manufacture, and the fifth digit means the month (e.g., with A for October, B for November and C for December).

For example, the serial number 1W07Axxxxxxx means October of year 2007.
**Customer Service**

We provide service guide for any problem as follow steps: First, contact with your distributor, sales representative, or our customer service center for technical support if you need additional assistance. You may have the following information ready before you call:

- Product serial number
- Peripheral attachments
- Software (OS, version, application software, etc.)
- Description of complete problem
- The exact wording of any error messages

In addition, free technical support is available from our engineers every business day. We are always ready to give advice on application requirements or specific information on the installation and operation of any of our products. Please do not hesitate to call or e-mail us.

**Safety Precautions**

- **Warning!**

Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the Player chassis.

- **Caution!**

Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.
Safety and Warranty

1. Please disconnect this equipment from any AC outlet before cleaning. Do not use liquid or spray detergents for cleaning. Use a damp cloth.

2. For pluggable equipment, the power outlet must be installed near the equipment and must be easily accessible.

3. Keep this equipment away from humidity.

4. Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.

5. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.

6. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

7. All cautions and warnings on the equipment should be noted.

8. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient over-voltage.

9. Never pour any liquid into an opening. This could cause fire or electrical shock.

10. Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.

11. If any of the following situations arises, get the equipment checked by service personnel:

   A. Liquid has penetrated into the equipment.

   B. The equipment has been exposed to moisture.

   C. The equipment does not work well, or you cannot get it to work according to the user’s manual.

   D. The equipment has been dropped and damaged.

   E. The equipment has obvious signs of breakage.

12. Do not leave this equipment in an uncontrolled environment where the storage temperature is below -20° C (-4°F) or above 60° C (140° F). It may damage the equipment.
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1. Introduction

1.1 Reference Solution Lineup with Intel Platform

The purpose of this document is to describe the thermal design requirements of the Digital Signage Pluggable Module. This module is based on the AMD Ontario T56N processor with AMD A55E Chipset platform and also future products. The Pluggable Module is targeted to provide an interchangeable solution to the digital signage media players with compatible connector. This document provides the module form factor, connector specification, reference thermal solution, and boundary conditions in order to ensure the functionally of the module in all compatible display panel system.

The Digital Signage Pluggable Module platform has two reference solutions, as listed in the table below:

<table>
<thead>
<tr>
<th>Digital Signage Pluggable Module</th>
<th>AMD Ontario Processor</th>
<th>CPU TDP(W)</th>
<th>Thermal Solution</th>
<th>System Dimension (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>T56N</td>
<td>18W</td>
<td>Active</td>
<td>200x119x30</td>
</tr>
</tbody>
</table>

1.2 Reference Documents

<table>
<thead>
<tr>
<th>Document</th>
<th>Document No./Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Signage Open Pluggable Specification</td>
<td>324427</td>
</tr>
</tbody>
</table>
1.3 Terms and Abbreviation

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIMM</td>
<td>Dual In-line Memory Module</td>
</tr>
<tr>
<td>EPIC</td>
<td>Embedded Platform for Industrial Computing form factor 165 mm x 115 mm</td>
</tr>
<tr>
<td>FAR</td>
<td>Free Area Ratio</td>
</tr>
<tr>
<td>OPS</td>
<td>Open Pluggable Specification</td>
</tr>
<tr>
<td>SATA</td>
<td>Serial ATA</td>
</tr>
<tr>
<td>SSD</td>
<td>Solid State Drive</td>
</tr>
<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
</tr>
<tr>
<td>VESA</td>
<td>Video Electronics Standards Association</td>
</tr>
<tr>
<td>Wifi</td>
<td>Wireless IEEE 802.11 technology</td>
</tr>
<tr>
<td>Wimax</td>
<td>Worldwide Interoperability for Microwave Access</td>
</tr>
</tbody>
</table>
2. Mechanical Assembly

2.1 Package Information

The AMD Ontario T56N comes in BGA packaging with package size 19x19 mm.

The A55E chipset that comes in an FCBGA package, which consists of a silicon die mounted face down on an organic substrate populated with solder balls on the bottom side. The package size of the PCH is 23x23 mm.

2.2 The Pluggable Module

Figure 1 shows the features overview of the Pluggable Module. The module front panel consists of the antenna slots, power/reset buttons, audio jacks, RJ45 connector, a HDMI port, and 2xUSB ports. The sides of the module consist of 4 guide holes which, when come into contact with the locking pins on the guide rail, lock the module during docking/undocking.

Figure 2 shows the dimensions of the Pluggable Module. The overall dimension of the module including the mounting frame is 200mm x 119mm x 30mm. Figure 2 also shows the location of the front panel screw holes as well as the security lock.
Figure 1. The Pluggable Module
Figure 2. Dimensions of the Pluggable Module
2.3 Mechanical Specifications

Figure 3 shows the Pluggable Module docked at a display panel system. In this reference design, the module is docked and undocked in vertical direction. There are two system fans that drive room temperature air to enter the system through the vent holes at the back cover. Notice that in Figure 3 the system fans are inclined at an angle to the vertical direction in order to align with the shape of the back cover.

Figure 3. Pluggable Module Docked in the Reference Display Panel

Figure 4 illustrates the airflow path to the Pluggable Module. Air at room temperature enters the system through the back vent holes and exit at the top through the extraction fans. In the passive heatsink module, air flows through the heatsink fins and carries away the heat. In the active heatsink module, air is forced through the fins by the fan so that higher cooling rate is achieved.

The details inside the Pluggable Module are shown in Figure 5. The top side of the PCB resides the CPU and the chipset. The heatsink comes into contact with these components so that heat is conducted to
the heatsink and cooled by air movement through the fins. The WiFi card and memory module are located at the bottom of the PCB.

Figure 4. Airflow to the Pluggable Module

*Fan is for illustration purpose only. Actual part may vary.*
Figure 5. Exploded View of the Pluggable Module
The Pluggable Module relies on a pair of guide rails for docking and undocking so that the plug connector at the back of the module can mate seamlessly with the receptacle on the docking board. **Figure 6** shows the docking process as the module slides through the guide rails. There are two lock pins on each side of the guide rail which serve as the locking mechanism to the module when they come into contact with the lock holes on the Pluggable Module. **Figure 7** shows the location of the lock holes on the module and **Figure 8** shows the detailed dimensions of one of the guide rails.
Figure 7. Location of Lock Hole on the Pluggable Module
Figure 8. Dimensions of the Guide Rail
Figure 9 shows the detailed location of the JAE TX25 plug connector. Pin 1 of the connector is located at 114.8 mm from the edge of the module, and 106.9 mm from the inner side of the front panel. For mating tolerance of TX25 plug connector and TX24 receptacle connector, please refer to the JAE specification.

Figure 9. Location of JAE TX25 Plug Connector
Figure 10 shows the cross-section of a display panel system when the Pluggable Module is plugged in. Noticing that in this reference design there is 10.4 mm clearance between the Pluggable Module and the display panel in order to avoid heating from the panel.

Figure 10. Cross-section Showing Recommended Clearance between Pluggable Module and the Display Panel

Figure 10, Figure 10 and Figure 10 show how to install the pluggable module. Firstly, horizontally put the pluggable module inside digital signage. Then, push the module into the bottom. Finally, the lock areas shown in red will be automatically fixed with the mechanical housing and then installation is done.
Figure 11.

Figure 13.

Figure 14.
Figure 5 shows the full platform dimension of the Digital Signage Pluggable Module display system. Figure 6 shows the dimension of the docking board in the system as well as the VESA mounting holes.

Figure 15. Platform Dimension for a Reference Display Panel System

Figure 16. Location of the VESA Mount on the Display Panel
3. Thermal Specifications

3.1 Thermal Management for the Pluggable Module

This section describes a wind tunnel test to quantify the thermal performance of the Pluggable Module. Figure 7 shows a thermal model of an arbitrary wind tunnel, where the Pluggable Module is situated at the front of the tunnel. Air flows in from the top grille with specified Free Area Ratio (FAR) so that air at room temperature enters the heatsink of the module. In this test, the FAR is set at 0.6 for reference. The outflow is controlled to obtain the desired airflow flowing through the module. It is required that module be designed to pass all component thermal specifications in this test setup with ambient temperature at 54°C and airflow speed of 0.7m/s immediately downstream of the module. All Pluggable Modules must be designed to pass this temperature and airflow requirement to ensure the module ingredients comply with thermal specification. Figure 12 shows the top view of the wind tunnel test and the location of the imaginary plane 3 mm downstream from the module outlet.
Figure 128. Airflow Speed Requirement Downstream of the Pluggable Module in Wind Tunnel Test

- Imaginary plane 3mm downstream of the Pluggable Module
  - Average airflow speed is 0.7 m/s
- 3mm
- Pluggable Module
- Top View of Wind Tunnel
3.2 Thermal Management in the Reference Display Panel System

The Pluggable Module relies on airflow from the system fans to achieve its cooling target. Figure 139 shows that in this reference design there are two 70x70 mm fans at the back panel to extract hot air from the system. There is also a 50x50 mm fan at the front panel to provide fresh air to the internal components such as power supply unit. The back cover of the display panel should have vent holes with FAR > 0.6 to provide sufficient airflow to the module.

Figure 139. System Fans and Ventilation Grille on the Display Back Panel
On the Pluggable Module, it is recommended that some vent holes be opened at the back so that hot air can escape more easily from the module. **Figure 20** shows that the FAR in on both sides of the module back panel should be greater than 0.25.

**Figure 20.** Vent Holes at the Pluggable Module Back Panel
4. Mechanical Design

4.1 The Prototype

The digital signage OPS prototype is based on a 32” display panel with the functional blocks illustrated in Figure 21. It is mainly a 3-board partitioning design consisting of the pluggable module, docking board and the panel control board.

Figure 21. Display Panel Rear View - Internal
4.2 Pluggable Board Reference Design Features

In this reference design, the pluggable prototype board is based on the Intel® Core™ i7 Mobile processor and Mobile Intel® QM57 Express chipset platform.

Table 1. Reference Design Board Features

<table>
<thead>
<tr>
<th><strong>OMAO -OPS (Optional Pluggable Specification)</strong></th>
<th><strong>SPEC.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MB Form Factor</strong></td>
<td>EPIC(165mm x 115mm)</td>
</tr>
<tr>
<td><strong>CPU</strong></td>
<td></td>
</tr>
<tr>
<td>Socket</td>
<td>413-pin Micro BGA (19mm x 19mm)</td>
</tr>
<tr>
<td>Type</td>
<td>AMD Ontario T56N 1.65GHz Dual Core Processor</td>
</tr>
<tr>
<td>CPU Power Consumption</td>
<td>18W</td>
</tr>
<tr>
<td><strong>Chipset</strong></td>
<td></td>
</tr>
<tr>
<td>PCH</td>
<td>AMD Hudson A55E chipset (605-pin FCBGA; 23mm x 23mm)</td>
</tr>
<tr>
<td><strong>Graphic</strong></td>
<td></td>
</tr>
<tr>
<td>GPU Core</td>
<td>AMD Radeon™ HD 6310 integrated in processor</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td></td>
</tr>
<tr>
<td>Channel</td>
<td>Single Channel Mode</td>
</tr>
<tr>
<td>Type</td>
<td>1 x DDR3 SO-DIMM</td>
</tr>
<tr>
<td>DDR</td>
<td>1066/1333MHz</td>
</tr>
<tr>
<td>Max Memory</td>
<td>8GB</td>
</tr>
<tr>
<td><strong>Audio</strong></td>
<td></td>
</tr>
<tr>
<td>chipset</td>
<td>Realtek RTL886</td>
</tr>
<tr>
<td><strong>External I/O</strong></td>
<td></td>
</tr>
<tr>
<td>Display Out</td>
<td>1 x HDMI</td>
</tr>
<tr>
<td>USB Port</td>
<td>2 x USB2.0 Port</td>
</tr>
<tr>
<td>Ethernet Port</td>
<td>1x RJ-45 LAN Port Gigabit Ethernet</td>
</tr>
<tr>
<td>Audio</td>
<td>1x Line-In, 1x Line-Out</td>
</tr>
<tr>
<td>Button</td>
<td>1 x Power On, 1 x Reset button</td>
</tr>
<tr>
<td>Antenna</td>
<td>Antenna x 2</td>
</tr>
<tr>
<td><strong>Internal I/O</strong></td>
<td></td>
</tr>
<tr>
<td>VGA</td>
<td>1 x VGA (2x4-pin) 2.0mm pitch wafer-header</td>
</tr>
<tr>
<td>Fan</td>
<td>1 x Fan (1x3-pin), one fan (1x3-pin) reserve</td>
</tr>
<tr>
<td><strong>Internal features</strong></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>1 x SATA Ports (option of 2.5&quot; HDD or SSD mounting)</td>
</tr>
<tr>
<td>WiFi Module</td>
<td>1 x Mini PCIe slot</td>
</tr>
<tr>
<td><strong>Pluggable Connector Interface</strong></td>
<td></td>
</tr>
<tr>
<td>Display Interfaces</td>
<td>HDMI/DVI</td>
</tr>
<tr>
<td>UART</td>
<td>1set RX/TX signals driven at 3.3V</td>
</tr>
<tr>
<td>Audio</td>
<td>1 channel audio out L/R</td>
</tr>
<tr>
<td>USB</td>
<td>3 x USB2.0 + 2 USB3.0 (reserve)</td>
</tr>
<tr>
<td>Power</td>
<td>DC IN +12V~+19V at recommended 4A max current rating</td>
</tr>
<tr>
<td>Control signals</td>
<td></td>
</tr>
<tr>
<td>*Pluggable board Power Status indicator</td>
<td></td>
</tr>
<tr>
<td>*Display panel IR remote control power button</td>
<td></td>
</tr>
<tr>
<td>*Pluggable board detect</td>
<td></td>
</tr>
<tr>
<td>*HDMI CEC</td>
<td></td>
</tr>
</tbody>
</table>
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5. BIOS Setting

Your computer comes with a hardware configuration program which called BIOS Setup that allows you to view and set up the system parameters.

The BIOS (Basic Input / Output System) is a layer of the software called ‘firmware’ which translates instructions from software (such as the operating system) into instructions that allow the computer hardware to understand the software programs. The BIOS settings also identify installed devices and establish many special features.

ENTERING BIOS SETUP

You can access the BIOS program just after you turn on your computer. Just press the “DEL” key when the following prompt appears:

Press <DEL> to enter Setup.

When you press <DEL> to enter the BIOS Setup image, the system interrupts the Power-On Self-Test (POST).

When you first enter the BIOS Setup Utility, you will enter the Main setup image. You can always return to the Main setup image by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup image is shown as below.
The Main BIOS setup image has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. On the contrary, options in blue can be configured. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

5.1 Advanced Setting

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legacy OpROM</td>
<td>Use this setting to ignore all PXE Option ROMs.</td>
</tr>
<tr>
<td>Disabled</td>
<td>Use this setting to load PXE Option ROMs. To limit the PXE support to particular devices, use the function Use device for PXE.</td>
</tr>
<tr>
<td>Enabled</td>
<td></td>
</tr>
</tbody>
</table>

Default: Disabled

Launch Storage OpROM

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled</td>
<td>Use this setting to ignore all PXE Option ROMs.</td>
</tr>
<tr>
<td>Enabled</td>
<td>Use this setting to specify that legacy PCI option ROMs for PCI storage devices are to be loaded and executed, if found. Typical examples of PCI storage devices include SCSI or similar devices.</td>
</tr>
</tbody>
</table>

Default: Enabled
PCI Subsystem Settings

PCI ROM Priority

Selects the PCI Option ROM to launch in case Multiple Option ROMs (Legacy ROM and EFI Compatible ROM) are present.
PCI Latency Timer

Use this function to select the number of PCI bus clocks to be used for the PCI latency timer.

<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 PCI Bus Clocks</td>
<td>Use this setting to program the PCI latency timer to 32 PCI bus clocks.</td>
</tr>
<tr>
<td>64 PCI Bus Clocks</td>
<td>Use this setting to program the PCI latency timer to 64 PCI bus clocks.</td>
</tr>
<tr>
<td>96 PCI Bus Clocks</td>
<td>Use this setting to program the PCI latency timer to 96 PCI bus clocks.</td>
</tr>
<tr>
<td>128 PCI Bus Clocks</td>
<td>Use this setting to program the PCI latency timer to 128 PCI bus clocks.</td>
</tr>
<tr>
<td>160 PCI Bus Clocks</td>
<td>Use this setting to program the PCI latency timer to 160 PCI bus clocks.</td>
</tr>
<tr>
<td>192 PCI Bus Clocks</td>
<td>Use this setting to program the PCI latency timer to 192 PCI bus clocks.</td>
</tr>
<tr>
<td>224 PCI Bus Clocks</td>
<td>Use this setting to program the PCI latency timer to 224 PCI bus clocks.</td>
</tr>
<tr>
<td>248 PCI Bus Clocks</td>
<td>Use this setting to program the PCI latency timer to 248 PCI bus clocks.</td>
</tr>
</tbody>
</table>

Default: 32 PCI Bus Clocks
PCI Latency Timer

VGA Palette Snoop: This field controls the ability of a primary PCI VGA controller to share a common palette (when a snoop write cycles) with an ISA video card.

Enables or Disables VGA Palette Registers Snooping.
Default: Disabled

PERR# Generation

Enables or Disables PCI Device to Generate PERR#.
Default: Disabled

SERR# Generation

Enables or Disables PCI Device to Generate SERR#.
Default: Disabled
PCI Express Settings

Set Maximum Read Request Size of PCI Express Device or allow System BIOS to select the value.

Relaxed Ordering

Enables or Disables PCI Express Device Relaxed Ordering.
Default: Disabled
### Extended Tag

<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled</td>
<td>Doesn’t allow the system to use 8-bit TAG field as a requester.</td>
</tr>
<tr>
<td>Enabled</td>
<td>Allow the system to use 8-bit TAG field as a requester.</td>
</tr>
</tbody>
</table>

Default: Disabled

### No Snoop

Enable or Disable PCI Express Device No Snoop option.

Default: Enabled

### Maximum Payload

Set Maximum Payload of PCI Express Device or allows System BIOS to select the value.

<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>Auto detect Maximum Payload</td>
</tr>
<tr>
<td>128 Bytes</td>
<td>Maximum Payload 128 Bytes.</td>
</tr>
<tr>
<td>256 Bytes</td>
<td>Maximum Payload 256 Bytes.</td>
</tr>
<tr>
<td>512 Bytes</td>
<td>Maximum Payload 512 Bytes.</td>
</tr>
<tr>
<td>1024 Bytes</td>
<td>Maximum Payload 1024 Bytes.</td>
</tr>
<tr>
<td>2048 Bytes</td>
<td>Maximum Payload 2048 Bytes.</td>
</tr>
<tr>
<td>4096 Bytes</td>
<td>Maximum Payload 4096 Bytes.</td>
</tr>
</tbody>
</table>

Default: Auto
### Maximum Read Request Size

Set Maximum Read Request Size of PCI Express Device or allows System BIOS to select the value.

<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto</td>
<td>Auto detect Maximum Read Request</td>
</tr>
<tr>
<td>128 Bytes</td>
<td>Maximum Read Request 128 Bytes.</td>
</tr>
<tr>
<td>256 Bytes</td>
<td>Maximum Read Request 256 Bytes.</td>
</tr>
<tr>
<td>512 Bytes</td>
<td>Maximum Read Request 512 Bytes.</td>
</tr>
<tr>
<td>1024 Bytes</td>
<td>Maximum Read Request 1024 Bytes.</td>
</tr>
<tr>
<td>2048 Bytes</td>
<td>Maximum Read Request 2048 Bytes.</td>
</tr>
<tr>
<td>4096 Bytes</td>
<td>Maximum Read Request 4096 Bytes.</td>
</tr>
</tbody>
</table>

Default: Auto
ASPN Support

Set the ASPM configuration for the PCI Express devices before the operating system boots. This function is for OS which does not support ASPM.

<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled</td>
<td>Disables ASPM</td>
</tr>
<tr>
<td>Auto</td>
<td>BIOS auto configure</td>
</tr>
<tr>
<td>Force L0s</td>
<td>Force all links to L0 State</td>
</tr>
</tbody>
</table>

Default: Disabled
- **Extended Synch**

  If this item is enabled, it will allow generation of Extended Synchronization patterns.
  
  Default: Disable

- **Link Training Retry**

  Defines number of Retry Attempts software will take to retrain the link if previous training attempt was unsuccessful.
<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled</td>
<td>Disables Link Training Retry.</td>
</tr>
<tr>
<td>2</td>
<td>Retry 2 times</td>
</tr>
<tr>
<td>3</td>
<td>Retry 3 times</td>
</tr>
<tr>
<td>5</td>
<td>Retry 5 times</td>
</tr>
</tbody>
</table>

Default: 5

- **Link Training Timeout (uS)**

Defines number of Microseconds software will wait before polling “Link Training” bit in Link Status register. Value range from 1 to 100 uS.

Default: 100
Unpopulated Links

In order to save power, software will disable unpopulated PCI Express links, if this option set to “Disable link.”

<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled Link</td>
<td>Disable unpopulated PCI Express links.</td>
</tr>
<tr>
<td>Keep Link on</td>
<td>Enable unpopulated PCI Express links.</td>
</tr>
</tbody>
</table>

Default: Keep Link on
Use Digital Signage Pluggable Module User's Manual

PCI Express GEN 2 Settings
Change PCI Express GEN Devices Settings

- PCI Express GEN 2 Settings

PCI Bus Driver Version | V 3.04.00
PCI Option ROM Handling
PCI ROM Priority | [PCI Compatible ROM]
PCI Common Settings Settings
PCI Latency Timer | [88 PCI Bus Clocks]
VGA Palette Swap | [Disabled]
PEER# Generation | [Disabled]
MS# Generation | [Disabled]

> PCI Express Settings

> PCI Express GEN 2 Settings

Completion Timeout
In device functions that support Completion Timeout programmability, allows system software to modify the Completion Timeout value “Default” 50uS to 50mS.

Default: Default

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➢ **ARI Forwarding**
If supported by hardware and set to “Enable”, the Downstream Port disables its traditional Device Number field being 0 enforcement when turning a Type1 Configuration Request into a Type0 Configuration Request, permitting access to extended immediately below the Port.

**Default:** Disabled

➢ **AtomicOp Egress Blocking**
If supported by hardware and set to “Enable”, this function initiates AtomicOp Requests only if Bus Master Enable bit is in the Command Register Set.

**Default:** Disabled

➢ **IDO Request Enable**
If supported by hardware and set to “Enabled”, this permits setting the number of ID-Based Ordering (IDO) bit (Attribute [2]) requests to be initiated.

**Default:** Disabled

➢ **IDO Completion Enable**
If supported by hardware and set to “Enabled”, this permits setting the number of ID-Based Ordering (IDO) bit (Attribute [2]) requests to be initiated.

**Default:** Disabled

➢ **LTR Mechanism Enable**
If supported by hardware and to “Enable”, this enables the Latency Tolerance Reporting (LTR) Mechanism.

**Default:** Disabled

➢ **End-End Prefix Blocking**
If supported by hardware and set to “ Enable”, this function will block forwarding of TLPs containing End-End TLP Prefixes.

**Default:** Disabled

➢ **Target Link Speed**
If supported by hardware and set to “ Force to 2.5 GT/s” for Downstream Ports, this sets an upper limit on Link operational speed by restricting the values advertised by the Upstream component in its training sequences. When “Auto” is selected HW initialized data will be used.

**Default:** Disabled
➢ **Selectable De-emphasis**
If supported by hardware, this will control transmission de-emphasis of target link when operating at 5.0 GT/s
**Default:** 3.5 GT/s

➢ **Clock Power Management**
If supported by hardware and set to “Enabled”, the device is permitted to use CLKREQ# signal for power management of Link Clock in accordance to protocol defined in appropriate form factor specification.
**Default:** Disabled

➢ **Compliance SOS**
If supported by hardware and set to “Enabled”, this will force LTSSM to send SKP Ordered Sets between sequences when sending Compliance Pattern or Modified Compliance Pattern.
**Default:** Disabled

➢ **Hardware Autonomous Width**
If supported by hardware and set to “Enabled”, this will disable the hardware’s ability to change link width except width size reduction for the purpose of correcting unstable link operation.
**Default:** enabled

➢ **Hardware Autonomous Speed**
If supported by hardware and set to “Enabled”, this will disable the hardware’s ability to change link speed except speed rate reduction for the purpose of correcting unstable link operation.
**Default:** enabled
ACPI Settings

-> ACPI Settings

Enables or Disables BIOS ACPI Auto Configuration

- ACPI Settings
- Enable ACPI Auto Configuration [Disabled]

Default: Disabled
> ACPI Sleep State

Enables or Disables System ability to Hibernate (OS/S3 Sleep State). This option may be not effective with some OS.

<table>
<thead>
<tr>
<th>SETTING</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspend Disable</td>
<td>System ability to Hibernate (OS/S3 Sleep State)</td>
</tr>
<tr>
<td>S3</td>
<td>Suspend to RAM</td>
</tr>
</tbody>
</table>

Default: S3 (Suspend to RAM)

> Lock Legacy Resources

Enables or Disable Lock of Legacy Resource.

Default: Disable

> S3 Video Repost

Enables or Disable S3 Video Repost.

Default: Disable
RTC Wake Settings

A **real time clock alarm** is a feature that can be used to allow a computer to 'wake up' after shut down to execute tasks every day or on a certain day. It can sometimes be found in the 'Power Management' section of a motherboard’s BIOS setup.

The system can be turned off with a software command. If you enable this item, the system can automatically resume at a fixed time based on the system’s RTC. Use the items below this one to set the date and time of the wake-up alarm.
Wake system with Fixed Time
Enable or disable System wake on alarm event.

Limit CPUID Maximum
Enable or disable System wake on alarm event.
CPU Configuration

- **Limit CPUID Maximum**

  Disabled for Windows XP

  **Default:** Disable
➢ **PSS Support**

Enable or disable the generation of ACPI_PPC, _PPS, and _PCT objects.

**Default:** Enable

➢ **PSTATE Adjustment**

This item is provided to adjust startup P-state level.

**Default:** PState 0
➢ **PPC Adjustment**

This item is provided to adjust _PPC object.

**Default:** PState 0

➢ **NX Mode**

Use this item to enable or disable No-execute page protection function.

**Default:** Enable

➢ **SVM Mode**

Enable or Disable CPU Virtualization.

**Default:** Enable

➢ **C6 Mode**

Enable or Disable C6.

**Default:** Auto
**Node 0 Information**

View Memory Information related to Node 0

---

**IDE Configuration**

IDE Devices Configuration.

---
### USB Configuration

USB Configuration enables Legacy USB support. The AUTO option disables Legacy support if no USB devices are connected. The DISABLE option will keep USB devices available only for EFI applications.

#### Default: Enabled
- **ECHI Hand-off**
  
  This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver.
  
  **Default:** Disabled

- **USB transfer time-out**
  
  The time-out value for control, bulk, and Interrupt transfers.

  ![USB configuration settings](image_url)

  **Default:** 20 sec
Devices reset time-out

USB mass storage device Start Unit command time-out.

Default: 20 sec

Devices power-up delay

Maximum time the device will take before it properly reports itself to the Host Controller. “Auto” uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

Default: Auto
- **Super IO Configuration**

System Super IO Chip Parameters.

<table>
<thead>
<tr>
<th>Super IO Configuration</th>
<th>Set Parameters of Serial Port 0 (COMA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Legacy OpROM Support</td>
<td></td>
</tr>
<tr>
<td>Launch FXL OpROM</td>
<td></td>
</tr>
<tr>
<td>Launch Storage OpROM</td>
<td></td>
</tr>
<tr>
<td>PCI Subsystem Settings</td>
<td></td>
</tr>
<tr>
<td>ACPI Settings</td>
<td></td>
</tr>
<tr>
<td>GPIO Configuration</td>
<td></td>
</tr>
<tr>
<td>IOM Configuration</td>
<td></td>
</tr>
<tr>
<td>USB Configuration</td>
<td></td>
</tr>
<tr>
<td>Super IO Configuration</td>
<td></td>
</tr>
<tr>
<td>EN Monitor</td>
<td></td>
</tr>
</tbody>
</table>

Set Parameters of Serial Port 0 (COMA)
- **Enable or Disable Serial Port (COM)**
  
  **Default:** Enable

- **Select an optimal setting for Super IO device.**
  
  **Default:** Auto
## HW Monitor

Monitor hardware status

### CPU smart Fan Mode Setting

Change mode of CPU/System Fan Controller.
- **Smart Fan PWM Control**

  When choose [Manual Mode], can set the PWM duty cycle from 0 to 255.

- **Smart Fan PWM Control**

  When choose [Thermal Cruise Mode], can set the temperature limits which the fan will start.

---

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*Digital Signage Pluggable Module User’s Manual*
5.2 Chipset

North Bridge Parameters

➢ Primary Video Device

Select Primary Video Device that BIOS will use for output.

Default: IGD Video
Digital Signage Pluggable Module User’s Manual

- **NB GPP Core Config**

  **NB GPP Core Configuration**

  Default: GPP_CORE_x4x1x1x1x1

- **Port 4 Control**

  Enable or Disable Port 4

  Default: Enable
- **ASPM Mode Control**

  NB root port ASPM mode control

  Default: Disable

- **Hotplug Mode Control**

  NB root port hotplug mode control

  Default: Hotplug Basic
- **Link Speed**

  NB root port Pcie link speed, the link speed may overwritten by Psp settings

  Default: Max Speed

- **IOMMU Mode**

  IOMMU is supported on LINUX based system to convert 32bit I/O to 64bit MMIO.

  Default: Disable

- **Memory Clock**

  This Option Allows User to select different Memory Clock. Default value is 400MHz.
**Default:** Auto

- **Memory Clear**

  Memory Clear functionality control.

**Default:** Disable

- **GFX Configuration**

  GFX Configuration
PSPP Policy

PCIe speed power policy

Default: Balanced-Low
Memory Configuration

Enable Integrated Graphics controller

Default: Auto
➢ **Back Integrated**

Enable or disable back integrated

**Default:** Enable

➢ **Node 0 Information**

View Memory Information related to Node 0.

---

<table>
<thead>
<tr>
<th>Port 4 Control</th>
<th>[Enabled]</th>
<th>View Memory Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASPM Mode Control</td>
<td>[Disabled]</td>
<td>+ related to Node 0</td>
</tr>
<tr>
<td>Hotplug Mode Control</td>
<td>[Hotplug Basic]</td>
<td>+</td>
</tr>
<tr>
<td>Link Speed</td>
<td>[Max Speed]</td>
<td>+</td>
</tr>
<tr>
<td>Port 5 Control</td>
<td>[Disabled]</td>
<td>+</td>
</tr>
<tr>
<td>ASPM Mode Control</td>
<td>[Disabled]</td>
<td>+</td>
</tr>
<tr>
<td>Hotplug Mode Control</td>
<td>[Disabled]</td>
<td>+</td>
</tr>
<tr>
<td>Link Speed</td>
<td>[Max Speed]</td>
<td>+</td>
</tr>
<tr>
<td>Port 6 Control</td>
<td>[Disabled]</td>
<td>+</td>
</tr>
<tr>
<td>ASPM Mode Control</td>
<td>[Disabled]</td>
<td>+</td>
</tr>
<tr>
<td>Hotplug Mode Control</td>
<td>[Disabled]</td>
<td>+</td>
</tr>
<tr>
<td>Link Speed</td>
<td>[Max Speed]</td>
<td>+</td>
</tr>
<tr>
<td>Port 7 Control</td>
<td>[Disabled]</td>
<td>+</td>
</tr>
</tbody>
</table>

**> [F5]: Select Screen**

**> [F3]: Optimised Defaults**

**> [F4]: Save & Exit**

**> [ESC]: Exit**

---

**Node 0 Information**

**Starting Address:** 0 KB  
**Ending Address:** 1052191 KB

**DIMM0:** size=1024 KB, speed=1333 MHz

---

➢ **South Bridge Parameters**

South Bridge Parameters
SB SATA Configuration

Option for SATA Configuration

<table>
<thead>
<tr>
<th>SB SATA Configuration</th>
<th>Options for SATA Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB CIR Version :</td>
<td>1.1.1.0</td>
</tr>
<tr>
<td>SB SATA Configuration</td>
<td></td>
</tr>
<tr>
<td>SB USB Configuration</td>
<td></td>
</tr>
<tr>
<td>SB IDE Asedia Configuration</td>
<td>Power On</td>
</tr>
<tr>
<td>Restore on AC Power Loss</td>
<td></td>
</tr>
</tbody>
</table>

**Digital Signage Pluggable Module User’s Manual**
OnChip SATA Channel
Enable or Disable serial ATA

Default: Enable

OnChip SATA Type
Native IDE /n RAID /n AHCI /n AHCI /n Legacy IDE /n IDE -> AHCI /n HyperFlash

Default: Legacy IDE
- **OnChip IDE mode**
  
  OnChip IDE mode Select

<table>
<thead>
<tr>
<th>OnChip SATA Channel</th>
<th>[Enabled]</th>
</tr>
</thead>
<tbody>
<tr>
<td>OnChip SATA Type</td>
<td>Legacy IDE</td>
</tr>
<tr>
<td>OnChip IDE Combined Mode</td>
<td>[Enabled]</td>
</tr>
<tr>
<td>Combined Mode Option</td>
<td>[SATA as primary]</td>
</tr>
<tr>
<td>SATA ESP on PORTO</td>
<td>[Disabled]</td>
</tr>
<tr>
<td>SATA Power on PORTO</td>
<td>[Enabled]</td>
</tr>
</tbody>
</table>

  **Default:** Legacy mode

- **SATA IDE Combined Mode**

  Enable or Disable SATA IDE Combined Mode.

  **Default:** Enable

- **Combined Mode Option**

  Combined Mode Option

  **Default:** SATA as primary

- **SATA ESP on PORTO**

  Enable or Disable SATA ESP on PORTO

  **Default:** Disable

- **SATA Power on PORTO**

  Enable or Disable SATA Power on PORTO

  **Default:** Enable
SB USB Configuration

Options for SB USB Configuration

- OHCI HC (Bus 0 Dev 18 Fn 0)

Enable or Disable OHCI HC (Bus 0 Dev 18 Fn 0)

Default: Enable

Digital Signage Pluggable Module User's Manual
- **USB Port 0~F11**

  Enable or Disable USB PORT 0~F11

  ![Image of USB Port 0~F11 settings](image102x434to516x682)

  **Default:** Enable

- **USB Device Wakeup From S3 or S4**

  Enable or Disable USB Device Wakeup From S3 or S4

  **Default:** Enable
SB HD Azalia Configuration

Options for SB HD Azalia

- HD Audio Azalia Device

Enable or Disable HD Audio Azalia Device

Default: Enable
- **HD Onboard PIN Config**
  Enable or Disable HD Onboard PIN Config.
  **Default:** Enable

- **Azalia Front Panel**
  Config Azalia Front Panel
  **Default:** Auto

- **SDIN0~3 Pin Config**
  SDIN0~3 Pin Config
  **Default:** Azalia

- **Azalia Snoop**
  Enable or Disable Azalia Snoop
  **Default:** Disable

- **Restore on AC Power Loss**
  **Default:** Power On
5.3 Boot

- **Setup Prompt Timeout**

  Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.

  ![Setup configuration interface](image)

  **Default:** 1

- **Bootup NumberLock State**

  Select the keyboard NumberLock State

  **Default:** On
- **Quiet Boot**
  Enable or Disable Quiet Boot Option.
  **Default:** Disable

- **Fast Boot**
  Enable or Disable Fast Boot Option.
  **Default:** Disable

- **GateA20 Active**
  UPON REQUEST – GA20 can be disabled using BIOS services. Always – do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.
  **Default:** Upon Request
Option ROM Messages

Set display mode for Option ROM

Default: Force BIOS

Interrupt 19 Capture

Allow option ROMs to trap Int 19

Default: Disable
5.4 Security

➢ Administrator Password

Set Administrator Password

<table>
<thead>
<tr>
<th>Password Description</th>
<th>Set Administrator Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>If ONLY the Administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup. If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights. The password must be 3 to 20 characters long.</td>
<td></td>
</tr>
</tbody>
</table>

➢ User Password

Set User Password
5.5 Save & Exit

Exit system setup after saving the change

- Save Changes and Exit
  Exit system setup after saving the changes.

- Discard Changes and Exit
  Exit system setup without saving any changes.

- Save Changes and Reset
  Reset the system after saving the changes.

- Discard Changes and Reset
  Reset system setup without saving any changes.

- Save Changes
  Save Changes done so far to any of the setup options.

- Discard Changes
  Discard Changes done so far to any of the setup options.

- Restore Defaults
  Restore/Load Defaults values for all the setup options.

- Save as User Defaults
  Save the changes done so far as User Defaults.

- Restore User Defaults
  Restore the User Defaults to all the setup options.