

Christie® MicroTiles™

USER MANUAL

020-100329-05

CHRISTIE®

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020-100329-05

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- (a) Damage occurring during shipment, in either direction.
- (b) MicroTiles are lightweight and relatively easy to move and install. However, wear and tear may occur if the product is repeatedly assembled and disassembled, especially if excessive force is used with the removal of screens and installation of vertical screws.
- (c) Problems caused by combination of the equipment with non-Christie equipment, such as distribution systems, cameras, video tape recorders, etc., or use of the equipment with any non-Christie interface device.
- (d) Damage caused by misuse, improper power source, accident, fire, flood, lightning, earthquake or other natural disaster.
- (e) Damage caused by improper installation/alignment, or by equipment modification, if by other than Christie service personnel or a Christie authorized service provider.
- (f) Failure due to normal wear and tear.
- (g) Damage due to operating beyond the products specified environment. This product is designed to operate in an environment of 5°C to 40°C (41°F to 104°F) and a relative humidity between 35% to 85% non-condensing.
- (h) MicroTiles are ideal for indoor, high ambient light environments. Avoid setting up the arrays in environments where the module temperature exceeds 50°C (122°F). This is especially true when exposing the screens to direct sunlight. Layers of the screen assembly will delaminate if exposed to environments where this temperature is exceeded. Prolonged exposure to UV radiation, including direct sunlight, may result in degradation of screen performance over time.
- (i) MicroTiles are not weatherproof, and should only be used outdoors if contained in an environmentally controlled enclosure that meets the operating requirements of the product.

PREVENTATIVE MAINTENANCE

Preventative maintenance is an important part of the continued and proper operation of your Christie® MicroTiles™. Please see the Maintenance section for specific maintenance items. Failure to perform maintenance as required, and in accordance with the maintenance schedule specified by Christie, will void the warranty.

1: Product Overview

- 1.1 Christie MicroTiles Overview 1-1
 - 1.1.1 Terminology 1-1
- 1.2 Safety Warnings and Guidelines 1-2
- 1.3 How MicroTiles Work 1-2
 - 1.3.1 System Overview 1-2
 - 1.3.2 MicroTiles 1-3
 - Mechanical Housing 1-3
 - 1.3.3 External Control Unit (ECU) 1-4
- 1.4 User Interface Overview 1-5
- 1.5 Purchase Record and Service Contacts 1-5
- 1.6 Order Guide 1-6
 - 1.6.1 Standard Components 1-6
 - 1.6.2 Optional Accessories 1-7
 - 1.6.3 Sample Ordering Quantities 1-7

2: Installation and Setup

- 2.1 Safety Guidelines 2-1
 - 2.1.1 Before Constructing an Array 2-1
- 2.2 Cabling and ECU Layout and Design 2-2
 - 2.2.1 Sample Design Configurations 2-2
 - Basic Setup - 1 ECU + (4x3) + 1 Media Source 2-2
 - ECU placement (master/slave) 2-3
 - Advanced Configurations 4 ECUs + (4x6) + 4 media sources 2-4
- 2.3 MicroTiles Installation 2-5
 - 2.3.1 Required Tools and Hardware 2-5
 - 2.3.2 Light Seal Trim Application 2-6
 - 2.3.3 Mount to Leveling Feet (Optional) 2-6
 - 2.3.4 Assemble First Row 2-7
 - 2.3.5 Assemble Additional Rows 2-10
 - 2.3.6 Install Screens 2-11
 - 2.3.7 How to Remove Screens 2-12
 - 2.3.8 Cable Routing 2-12
- 2.4 Cooling 2-13
- 2.5 Thermal Actuator 2-14
- 2.6 Mounting Orientations 2-15
- 2.7 Connecting Sources 2-16
 - 2.7.1 Displaying Content 2-17
 - 2.7.2 Connect to Power 2-18
 - Power Distribution 2-18
 - Install Security Clip onto Power Connection 2-19

Power ON	2-19
Power Down	2-19
2.8 Disassembling a MicroTiles Array	2-20
 3: Operation	
3.1 Powering Up the MicroTiles Array	3-1
3.1.1 If a Display Unit Fails to Power Up.....	3-1
3.2 Powering Down the MicroTiles Array	3-1
3.3 Status Indicators.....	3-2
3.4 R100 Remote Control	3-3
3.4.1 Guide to Keypads.....	3-4
3.4.2 Keypad Commands	3-4
Function	3-6
Help	3-6
3.4.3 Pairing the Remote to the ECU via the OSD	3-6
Remote Pairing via the OSD	3-6
3.5 Using the On-Screen Display (OSD).....	3-7
3.5.1 OSD Functionality	3-7
3.5.2 OSD Guidelines	3-8
3.5.3 Navigating the OSD Menus	3-8
3.5.4 OSD Source Management Menu	3-9
3.5.5 OSD Canvas Management Menu.....	3-10
OSD Canvas Management Menu Continued>Canvas Settings	3-11
OSD Canvas Management Menu Continued>Diagnostics and Calibration	3-12
3.5.6 OSD Configuration Menu	3-13
3.5.7 OSD Status Menu.....	3-14
3.5.8 OSD Help Menu.....	3-15
3.6 Using the Web User Interface (WebUI)	3-15
3.6.1 Recommended System Requirements.....	3-15
3.6.2 WebUI Menu Tree	3-16
3.7 Navigating the WebUI.....	3-17
3.8 WebUI Source Management Menu	3-17
3.8.1 Adjust Image Settings	3-18
3.8.2 Adjusting Sharpness.....	3-19
3.8.3 Change Size and Position of Video Content.....	3-20
Global Video Input Source Properties	3-20
Display Window	3-20
3.8.4 Customize Extended Display Identification Data (EDID).....	3-21
3.9 WebUI Canvas Management Menu.....	3-22
3.9.1 Select a Display Mode	3-23
Display Mode Options	3-23

- 3.9.2 Layout 3-24
 - Physical Mapping 3-24
 - Subarray Configuration 3-26
 - ECU Priority 3-28
 - Automatic Mapping 3-29
- 3.9.3 Canvas Settings 3-30
 - Color and Luminance 3-30
 - Luminance Levels 3-30
- 3.9.4 Mullion Reduction 3-31
- 3.9.5 Tile Uniformity 3-31
- 3.9.6 Advanced Canvas Settings 3-32
 - Tile Color and Luminance 3-32
 - Tile Image Alignment 3-33
- 3.9.7 Display a Test Pattern 3-34
- 3.10 Configuration Menu 3-35
 - 3.10.1 Power ON/OFF All Tiles 3-35
 - 3.10.2 Resetting Selected Tile(s) and ECU(s) 3-35
 - 3.10.3 Set Date and Time 3-35
 - 3.10.4 Upgrading Main Firmware 3-36
 - Check Current Firmware Version from OSD 3-36
 - Check Current Firmware Version from WebUI 3-36
 - Upgrade Firmware 3-38
 - 3.10.5 Hardware Upgrades 3-40
 - Upgrading the Field Programmable Gate Array (FPGA) 3-40
 - 3.10.6 Remote Control 3-41
 - Remote Pairing via the WebUI 3-41
 - 3.10.7 Restore Factory Defaults 3-42
- 3.11 Status Menu 3-43
 - 3.11.1 System Information - Web Application 3-43
 - 3.11.2 System Information - ECU 3-44
 - 3.11.3 System Information - Tiles 3-45
 - Tile Properties 3-45
 - Display Unit Firmware Versions 3-47
 - Tile Logs 3-48
 - 3.11.4 Help Menu 3-48

4: Maintenance

- 4.1 Cleaning Procedures 4-1
 - 4.1.1 Cleaning Inside Screen Surface 4-1
 - 4.1.2 Cleaning Outside Screen Surface 4-1
 - 4.1.3 Lens 4-1

4.1.4 Light Engine Heat Sinks 4-1

5: Troubleshooting

5.1 Failed to Power Up 5-1

5.2 WebUI Common Errors 5-1

 5.2.1 Unmapped Tiles Found 5-1

 5.2.2 System Not Responding 5-2

 5.2.3 EDID Restore 5-2

6: Specifications

6.1 General Specifications 6-1

 6.1.1 Model Numbers 6-1

 6.1.2 Display Unit Dimensions 6-1

 6.1.3 ECU Dimensions 6-1

 6.1.4 Display Specifications 6-1

 6.1.5 Processing and Control 6-2

 6.1.6 Power 6-2

 6.1.7 Operating Specifications 6-2

 6.1.8 Accessories 6-2

 6.1.9 Regulatory Approvals 6-2

 6.1.10 Limited Warranty 6-3

6.2 Advanced Specifications 6-3

A: OSD Menu Tree

1 Product Overview

1.1 Christie MicroTiles Overview

Christie MicroTiles (MicroTiles) are modular, high-quality image display units with related accessories which, when combined, form large arrays of virtually any size and shape. The modular design uses rear projection, based on a single TI Digital Micromirror Device™ (DMD) and chipset. High brightness LEDs provide the illumination source. MicroTiles can be quickly and easily deployed into small display configurations, while providing the additional features required for larger and more complex installations.



Figure 1-1 Christie MicroTiles Display Unit

1.1.1 Terminology

- **MicroTiles:** Refers to some tiles.
- **Tile(s):** Consists of a display unit and a screen.
- **External Control Unit (ECU):** Controls MicroTiles arrays, video input source.
- **Master ECU:** Only 1 master ECU can be assigned to a canvas. This master supplies the global video source.
- **Slave ECU:** Supplies local video sources in multiple ECU configurations.
- **Canvas:** A group of tiles and ECUs that are connected together electronically. To constitute a canvas, tiles do not need to be physically adjacent to one another. The maximum number of tiles in a canvas is 1024, and the maximum number of ECUs is 128.
- **Array:** A group of tiles that are physically connected to each other. A canvas may include multiple arrays. Video sources are mapped to arrays of tiles. Each array represents a new source mapping.
- **Sub-array:** A group of tiles within an array that are configured to display either the local or global video source. A single array may contain multiple subarrays.
- **Media Source:** Provides the source for the input signal.
- **Global Source:** The media source connected to the master ECU also functions as a “global source”. The global source can be displayed on any group of tiles connected to the local source input (HSSL-1) side of the master ECU. In a closed loop canvas, all tiles can display the global source.
- **Local Source:** The media source connected to an ECU as a “local source”, feeding the local set of tiles connected to its local source output (HSSL-2).
- **Open Loop:** An open loop canvas terminates with the last tile in the canvas, which is not connected back to the first ECU.
- **Closed Loop:** In a closed loop canvas, the last tile in the canvas is connected back to the first ECU. There are no unused Display Port connections in a closed loop canvas.

1.2 Safety Warnings and Guidelines



When the screen is removed, directly viewing the beam with an optical instrument (for example, an eye loop, magnifier or microscope) from a distance of less than 100mm may pose an eye hazard. Christie® MicroTiles™ (Christie MicroTiles) is a class 1M source of visible and invisible LED radiation with a maximum power rating of 3.61mW @ 400-700nm.

⚠ WARNING Electrical Shock Hazard: Always power down and disconnect/disengage all power sources to the Christie MicroTiles before servicing or cleaning. Read and understand all product safety labels before installing/operating this product.

⚠ CAUTION A minimum 2" (50mm) gap must be left at the back of all tile arrays to ensure proper air flow and cooling. If the array is installed in an enclosed area additional cooling may be required to limit the maximum temperature of the inlet air, in order to comply with safety regulations and local codes. Each tile requires 70 CFM (33 L/s) of input cooling air. Maximum cooling load is 110W (375 BTUs/hr) per tile, when operating at full brightness. The inlet air temperature cannot exceed the maximum operating temperature. For details, refer to 6.1.7 Operating Specifications, on page 6-2.

1.3 How MicroTiles Work

The self-contained mechanical and optical design allows multiple tiles to be stacked together into an array of any size or configuration. Custom electronics allow the array to be completely self-configuring without any external hardware. The video signal to be displayed is fed into the array via an External Control Unit (ECU). This signal is buffered and converted into a high speed (5 Gbps) serial stream and relayed to every tile in the array. Each tile captures a portion of the image and applies scaling, as required, which results in a single picture. The ECU also acts as the main system controller and coordinates with all connected tiles to form a canvas.

1.3.1 System Overview

MicroTiles consist of several subsystems, which includes the mechanical housing, screen and Fresnel lens, light engine, Front End Formatter Board (FEFB), IR sensor, internal Low Voltage Power Supply (LVPS) and cooling system. An array of MicroTiles requires at least one ECU (Global ECU), acting as a main control unit and input interface for image content distribution through the array.

1.3.2 MicroTiles

Mechanical Housing

The mechanical housing comes equipped with internal supports, which are designed to support small arrays. For larger arrays, external supports are required. MicroTiles are optimized to operate in an upright, landscape orientation; however, they can be operated in many other orientations except ceiling mount (see [2.6 Mounting Orientations, on page 2-15](#)), as long as the cooling and support requirements are met. Product cooling and mechanical support is the responsibility of the end user. For information on installation specifications for simple and complex structures, refer to [Section 2 Installation and Setup](#).

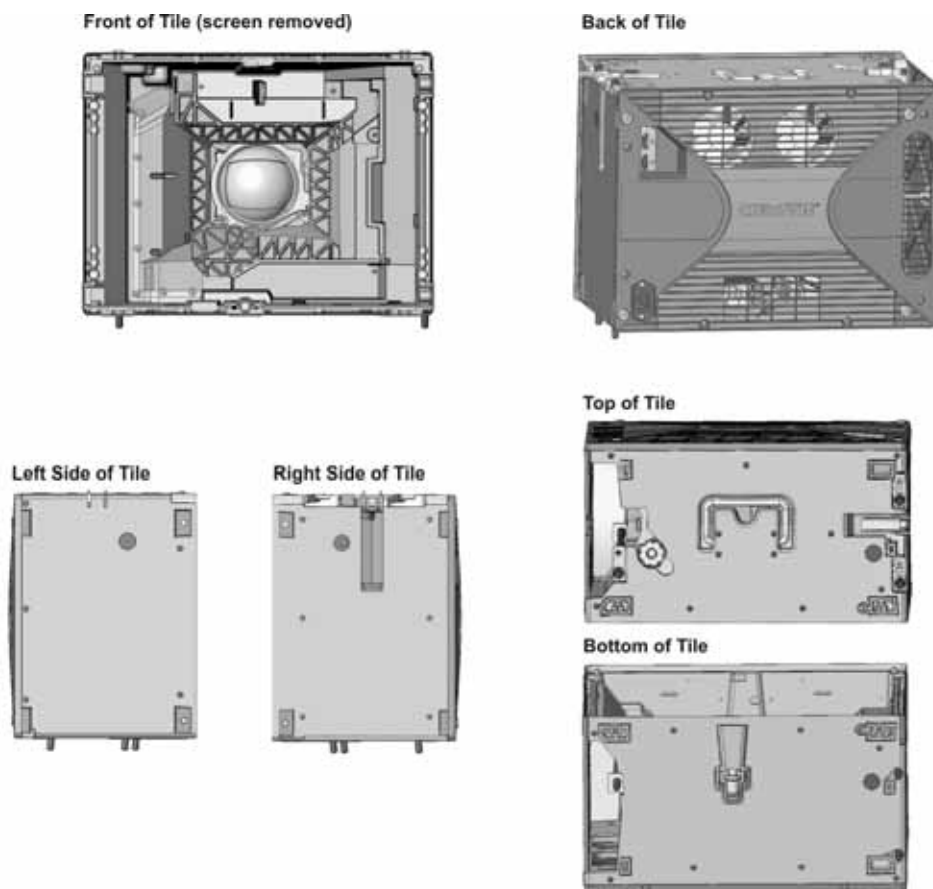


Figure 1-2 MicroTiles

Rear Projection Screen

NOTICE: *Avoid touching the screen surface. Always handle the screen from the sides. Remove all hand jewelry before handling the screens.*

The screen is designed to display high-quality images under a wide range of viewing angles and high ambient lighting conditions. The screen has a matte non-glare front surface that reduces specular reflections from adjacent light sources and maintains the contrast and luminance uniformity of the displayed image. The screen is designed to display a sharp image formed close to the screen edge to allow for image blending from screen to screen when tiled in an array. The screen material has expansion characteristics that are low and closely matched for the screen elements. This allows the screen to retain its dimensions in various operational environments and prevent separation between the screen elements that would induce unwanted image artifacts. The screen is attached magnetically to the housing. The screen can be easily removed by applying suction with a screen removal tool (supplied). In the event that the magnets fail to retain the screen, for instance due to extreme vibration of the housing, an integral tether ensures the screen remains attached to the housing. For proper cleaning instructions, refer to [4.1.2 Cleaning Outside Screen Surface, on page 4-1](#).



Figure 1-3 MicroTiles Screen

1.3.3 External Control Unit (ECU)

A MicroTiles array requires an ECU (**Figure 1-4**) in order to display an image across the entire array. End users connect a PC or media player to the array using a DVI-D cable. The ECU then ensures the supplied video signal is properly displayed across the entire array. For more complex arrays, multiple ECUs can be used.

The ECU is able to communicate with all tiles in the array and with any other ECU using Christie's proprietary HSSL interface. Each tile and ECU has a unique IP address, allowing full communication between tiles and ECUs across the network. The address of each tile is assigned using DHCP. For more information, refer to [2.7 Connecting Sources, on page 2-16](#).

NOTICE: *The Web User Interface (WebUI) is only functional on a Global ECU. It does not communicate with local ECUs.*

In a multiple ECU array, one ECU acts as the Global ECU, while all remaining ECUs act as Local ECUs. Multiple Global ECUs can occur when an array is powered up with more than one ECU attached. On start-up, all ECUs assume they are the Global ECU and begin the self-organization process. When two ECUs encounter each other, one of the ECUs is chosen to be the Global ECU. If immediately prior to the last power down, one of the two ECUs had been acting as the Global ECU and the other as a Local ECU, then the unit last identified as the Global ECU remains identified as such. If both ECUs (or neither) had been the Global ECU, then the



Figure 1-4 MicroTiles ECU

next level of priority is based on firmware revision, where the ECU with the newest firmware takes precedence.

A sophisticated external software application is also available to clients, which provides a graphical method of viewing the installation where the on-screen layout of the MicroTiles matches the physical installation. Users are able to arrange/change the configuration and view the results via the on-screen layout of the software. For more information, go to www.microtiles.com and click on MicroTiles Designer.

1.4 User Interface Overview

MicroTiles incorporate two basic user interface systems; the On Screen Display (OSD) and the Web User Interface (WebUI), which both come standard with the ECU. For the most part, the OSD and WebUI contain the same features and functionality. However, the WebUI is faster to operate, but requires an Ethernet connection, a PC with web browser and an Adobe® Flash Player™ Plug-in. Additionally, the WebUI enables you to update the firmware (firmware/FPGA) and select individual tiles, where the OSD does not. The OSD is accessed via the R100 Remote Control. For more information about the OSD, refer to [3.4 R100 Remote Control, on page 3-3](#) and [3.5 Using the On-Screen Display \(OSD\), on page 3-7](#). For more information about the WebUI, refer to [3.6 Using the Web User Interface \(WebUI\), on page 3-15](#). Each interface provides access to MicroTiles configuration, control and diagnostics tools.

1.5 Purchase Record and Service Contacts

Whether the MicroTiles are under warranty or the warranty has expired, Christie's highly trained and extensive factory and dealer service network is always available to quickly diagnose and correct tile malfunctions. Complete service manuals and updates are available for the MicroTiles. Should a problem be encountered with any part of the MicroTiles, contact your dealer. In most cases, servicing is performed on site. If you have purchased MicroTiles, keep a copy of the packing slip shipped with your purchase for your records. The packing slip contains the serial numbers for each tile. The serial number can also be found on the licence label located on the back of the tiles, as well as on the front chassis.

1.6 Order Guide

For a detailed overview visit www.microtiles.com.

1.6.1 Standard Components

The items listed in **Table 1.1** will be ordered with every system.

Table 1.1 Standard System Components

Item	Part Number	Part Description	Details
Display Unit	123-001102-xx	MicroTiles Display Unit D100	Each display unit includes a one meter display port cable.
Screen	123-102104-xx	MicroTiles Screen S100	Ordered separately from display unit.
External Control Unit	123-101103-xx	MicroTiles ECU E100	Includes a three meter display port cable, Y power cord and line cord.
User Kit	123-103105-xx	MicroTiles User Kit	Includes: R100 Remote Control, screen removal tool, Christie MicroTiles Quick Setup Guide, Christie MicroTiles User Manual (with CD containing additional technical documentation).
Setup Kit	123-104106-xx	MicroTiles Setup Kit	One kit supports up to nine MicroTiles. Each kit includes nine Y-power cords, a line cord, roll of light seal trim, nine power cord security clips and Horizontal Adjustment Screws for fine optimization of screen gaps.

1.6.2 Optional Accessories

The items listed in **Table 1.2** are optional, but in many cases may be required or recommended. To order additional kits and hardware go to www.microtiles.com.

Table 1.2 Optional Accessories

Item	Part Number	Part Description	Details
End Foot Kit	123-105107-xx	MicroTiles Foot/Ends (includes left and right end feet)	Leveling feet are recommended to help level the bottom row when building on a supporting structure. Order one end foot kit per array.
Center Feet	123-106108-xx	MicroTiles Foot/Center (3-pack)	Order one center foot in between each column.
Mounting Bracket	123-107109-xx	MicroTiles Mounting Bracket (2-pack)	One required for every tile that is added to rows 6 and above in an array.

1.6.3 Sample Ordering Quantities

The items in **Table 1.3** list a sample bill of materials for a floor mounted 9x9 Christie MicroTiles array, which in this example consists of 81 tiles and three ECUs.

Table 1.3 Order Quantities for a 9x9 Array

Part Number	Part Description	Qty.	Calculation Notes
123-001102-xx	MicroTiles Display Unit D100	81	
123-102104-xx	MicroTiles Screen S100	81	One per display unit.
123-101103-xx	MicroTiles ECU E100	See note	The number of ECUs is a design choice and affects the maximum content resolution of the display. For help in determining the number of ECUs, access the online calculator at www.microtiles.com .
123-103105-xx	MicroTiles User Kit	1	One per system.
123-104106-xx	MicroTiles Setup Kit	9	1 kit supports 9 MicroTiles. For a 9x9 array 9 Setup Kits are required.
123-105107-xx	MicroTiles Foot/Ends	1	1 kit (includes left/right) per bottom row.
123-106108-xx	MicroTiles Foot/Center (3-pack)	3	Count bottom row = 9 tiles Subtract 1 = 8 joints = 8 feet required
123-107109-xx	MicroTiles Mount Bracket (2-pack)	18	Count above five high = 9 x 4 = 36 tiles

2 Installation and Setup

2.1 Safety Guidelines



When the screen is removed, directly viewing the beam with an optical instrument (for example, an eye loupe, magnifier or microscope) from a distance of less than 100mm may pose an eye hazard. MicroTiles are a class 1M source of visible and invisible LED radiation with a maximum power rating of 3.61mW @ 400-700nm.

⚠ DANGER Electrical Hazard! Up to nine tiles may be connected per daisy chain when hooking up the power supply. This is the maximum power carrying capability of the power cord.

⚠ WARNING Always power down and disconnect/disengage all power sources to the MicroTiles before servicing or cleaning. Read and understand all product safety labels before installing/operating this product.

2.1.1 Before Constructing an Array

NOTICES:

- 1) The configuration of an array will vary from one installation to the next and thus, the following instructions are to be used as a guideline **ONLY**.
- 2) When constructing any size array always complete the first row and ensure it is flat before continuing with the next row. **DO NOT** attempt to construct the array column by column.
- 3) Power up each tile to ensure it is functioning. Check the LED on the back of the tile. A green light indicates power is enabled. Should the tile fail to power up, refer to Section 5 Troubleshooting for more information.
- 4) **DO NOT** remove the lens guard from the MicroTiles or dust cap from the lens until the array is constructed

2.2 Cabling and ECU Layout and Design

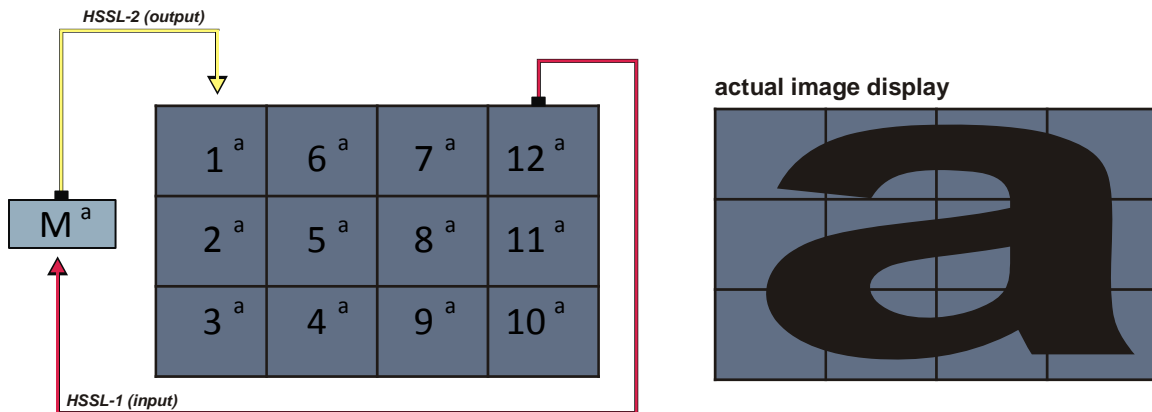
Before an array is constructed, it is important to plan the design layout of the canvas to make sure that ECU placement and the cabling layout supports the overall canvas design objectives. MicroTiles offers considerable flexibility in terms of the number of media sources that can be displayed and the overall resolution of the canvas. This section offers simplified examples of possible designs configurations. For assistance in planning and visualizing a canvas, download MicroTiles Designer™ from www.microtiles.com.

Color and brightness matching, as well as certain other functions, may be performed across an entire canvas. For details, refer to [3.8.1 Adjust Image Settings, on page 3-18](#).

2.2.1 Sample Design Configurations

Basic Setup - 1 ECU + (4x3) + 1 Media Source

By default, the media source will be scaled over the entire array. If you want to crop or repeat the media source you must configure sub-arrays. **Figure 2-1** depicts a simple canvas with one ECU. The cabling scheme provides redundancy, meaning the source travels both ways around the loop. For details, refer to [3.9.3 Canvas Settings, on page 3-30](#).



Legend:

- 'M' represents the master ECU and 'a' represents the media source.
- '1' represents the tile number and 'a' represents the media source displayed on the tile.
- The red arrow represents the input source (HSSL-1).
- The yellow arrow represents the output source (HSSL-2).

Figure 2-1 Basic Closed-loop Configuration

ECU placement (master/slave)

In **Figure 2-2**, Diagram 1 shows two local sets; a local set of 5 tiles connected to the master ECU, and a local set of 4 tiles connected to the slave ECU. Diagram 2 shows a single local set connected to the slave ECU. For more information on master and slave ECUs, refer to [ECU Priority, on page 3-28](#). A canvas may be open loop or closed loop. An open loop canvas terminates with a local set of tiles. In a closed loop canvas, the final local set of tiles is connected back to the local source input on the first ECU. Diagram 1a depicts the various subarray configurations for this type of application. If you want to crop or repeat the media source or toggle between media sources on specific tiles, configure sub-arrays. For more information on subarrays, refer to [Subarray Configuration, on page 3-26](#).

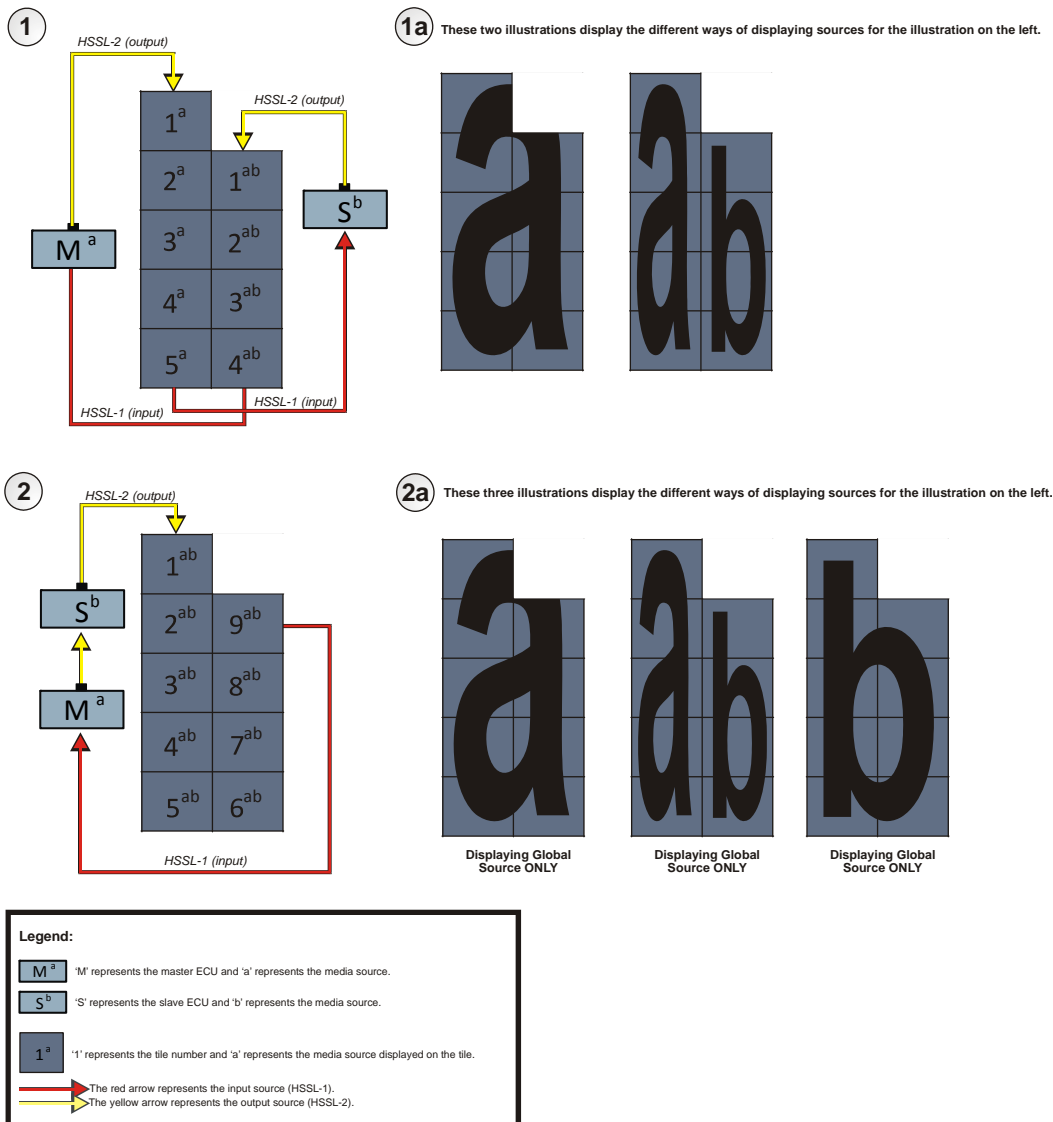


Figure 2-2 Slave and Master ECU Configuration

Advanced Configurations 4 ECUs + (4x6) + 4 media sources

In **Figure 2-3**, Diagram 1 illustrates how subarrays can be created for each local set of tiles. Diagrams 2 and 3 show the result when each subarray in Diagram 1 shows the local source or global source respectively. Diagram 4 shows how the global source can be shown on the entire array in a closed loop canvas.

NOTES: 1) Each tile is only capable of displaying 2 video sources. 2) Christie supplies a 3m cable; however, up to 7m max is supported at this time. Therefore, it is important to carefully plan out the physical placement of the ECUs to ensure the longest display port cable length is within the limitations.

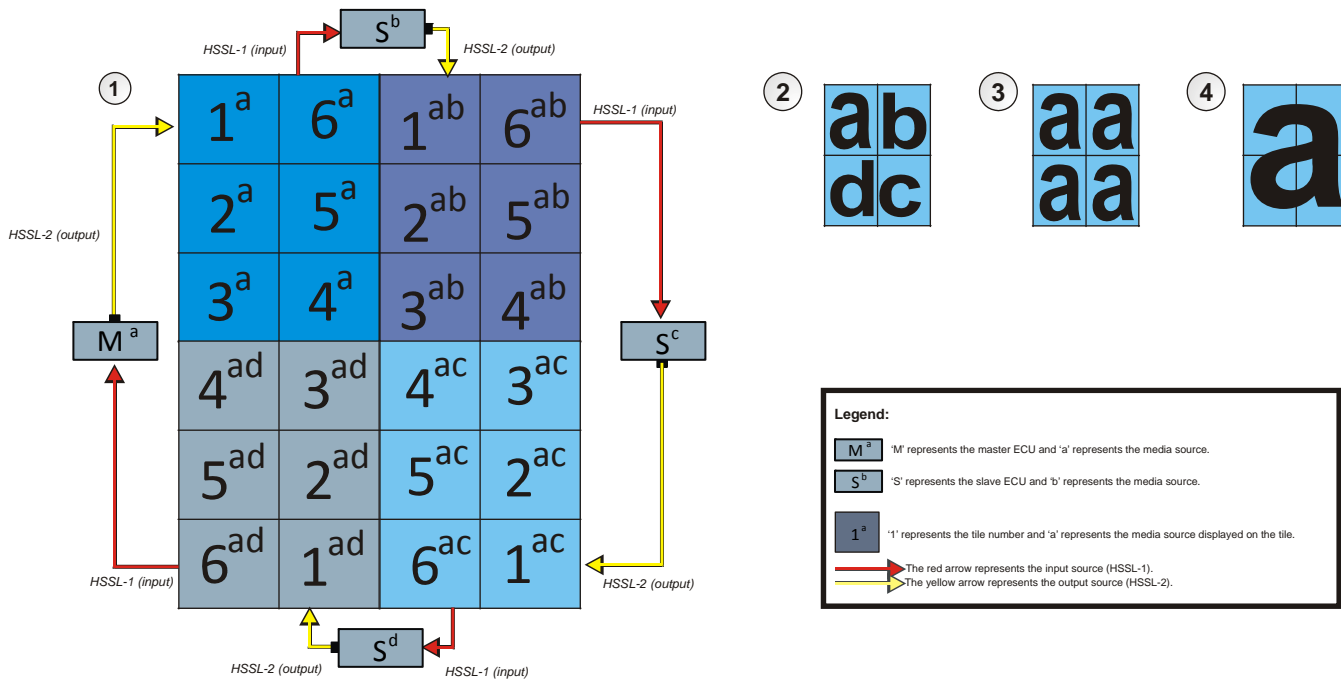


Figure 2-3 Advanced Subarray Configuration

2.3 MicroTiles Installation

These instructions explain how to install, connect and optimize the MicroTiles for smooth operation. Before installing, it is important to fully understand all site requirements and characteristics. This document outlines installations which are no higher than five rows and no wider than 10 columns. Consult your Christie Dealer for installation exceeding these dimensions.

⚠ CAUTION A minimum 2" (50mm) gap must be left at the back of all arrays to ensure proper air flow and cooling. If the array is installed in an enclosed area additional cooling may be required to limit the maximum temperature of the inlet air, in order to comply with safety regulations and local codes. Each tile requires 70 CFM (33 L/s) of input cooling air. Maximum cooling load is 110W (375 BTUs/hr) per tile, when operating at full brightness. The inlet air temperature cannot exceed the maximum operating temperature. For details, refer to 6.1.7 Operating Specifications, on page 6-2.

2.3.1 Required Tools and Hardware

For every MicroTiles system you will need Display Units, Screens (one per display unit), External Control Units (ECUs) and Setup Kits (one per nine display units) and a User Kit. This combination provides the tools and hardware shown in **Figure 2-4**. For a complete overview of the available kits, refer to [1.6 Order Guide, on page 1-6](#). For detailed information, go to www.microtiles.com.

1. Assembly Tool
 2. 18mm-M6 Socket Head Cap Screw for Horizontal Alignment (x18)
 3. Screen Removal Tool
 4. 321mm-M8 Vertical Alignment Rods (x3)
 5. Screen Assembly
 6. Display Port Cable (*one per tile*)
 7. End and Center Leveling Feet (optional)
 8. Y-Power Cord
 9. ECU
 10. Grille with Hardware (optional)
- Not Shown:
 - Display Unit (*tile without screen*)
 - Straight Edge (*not provided*)
 - 5mm hex key (*not provided*)
 - Light Seal Trim

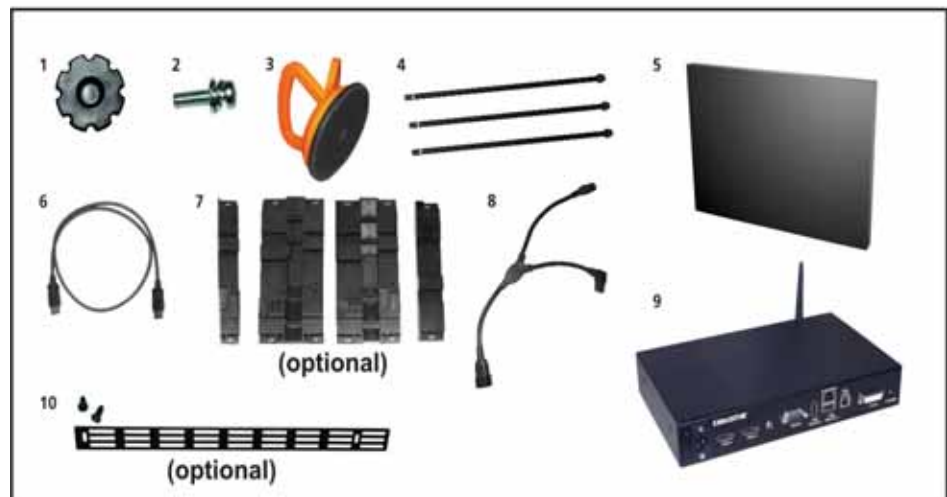


Figure 2-4 Tools and Hardware

2.3.2 Light Seal Trim Application

The light seal trim is supplied with the Setup Kit (P/N: 123-104106-01) and is used to prevent light leakage between the tiles in the array. It is typically used for applications where there is lighting in the space behind the tiles. If required, apply the light seal trim, as shown in **Figure 2-5** onto each tile before adding it to the array.



Figure 2-5 Apply Light Seal Trim

2.3.3 Mount to Leveling Feet (Optional)

⚠ DANGER If the array is mounted to the leveling feet it is mandatory they are fastened to an adequately ballasted base structure anytime the array is two rows or higher to prevent tipping and provide stability.

The leveling feet are used when constructing an array two rows or higher to bolt the array down to prevent tipping, and to level and tilt small arrays. The leveling feet come equipped with machined points for bolting the array down, but the fastening hardware is not supplied. Use either M6 or 1/4" hardware. Follow all local area standards and safety regulations when bolting the array. **NOTICE: Ensure the surface underneath the array is flat.**

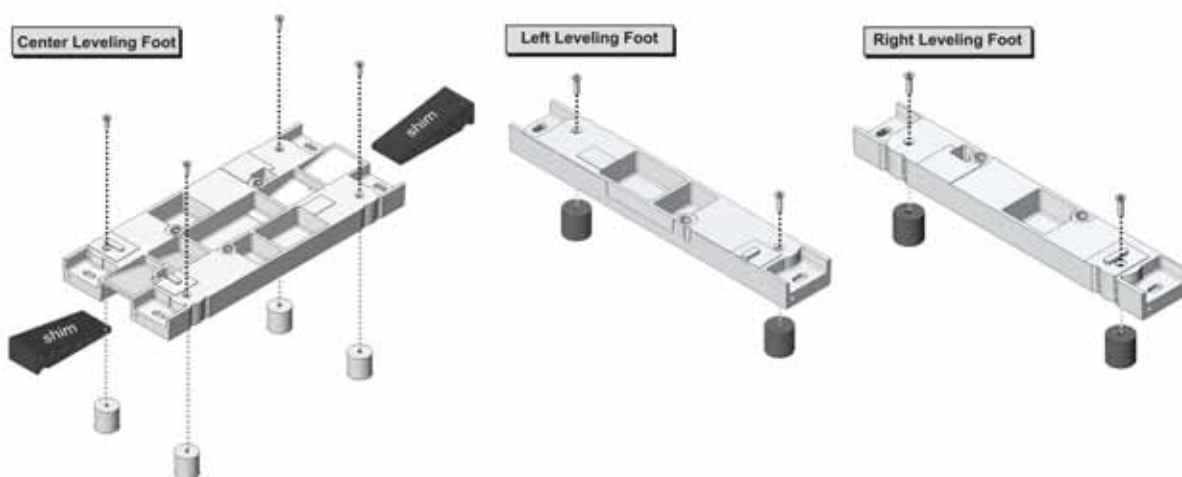


Figure 2-6 Leveling Feet

2.3.4 Assemble First Row

1. Ensure the latches on each tile are open before beginning (**Figure 2-7**).
2. Assemble the first tile in the array to a left and center leveling foot (**Figure 2-7**).
3. Insert the three vertical screws that are shipped with the MicroTiles into the three positions indicated in **Figure 2-7**.
4. Detach the assembly tool from the top of the MicroTiles and hand-tighten the three vertical screws to mount the tile to the feet (**Figure 2-7**). **DO NOT** completely tighten the screws at this point to allow for adjustments. **NOTICES: 1) DO NOT use power tools to tighten the vertical screws. 2) DO NOT use the vertical screws as anchors to hang the array.**

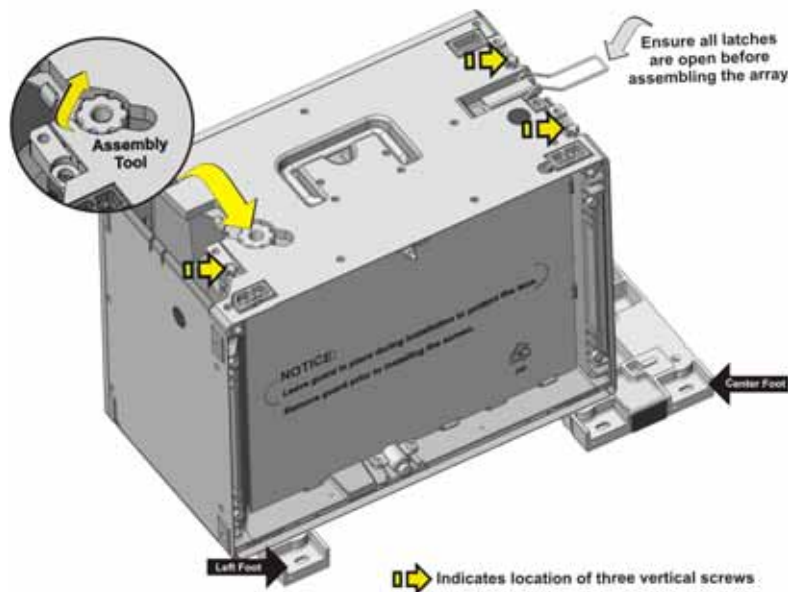


Figure 2-7 Assembly Tool and Leveling Feet

- Assemble the next tile in the array to a center leveling foot only (**Figure 2-8**). Using the assembly tool, hand-tighten the two vertical screws to attach the tile to the center foot. **DO NOT** completely tighten the screws to allow for adjustments. Line the tile with the center foot to the previous tile with left and center feet (**Figure 2-8**). Using the assembly tool, hand tighten the vertical screw on the second tile to attach it to the center foot of the previous tile.

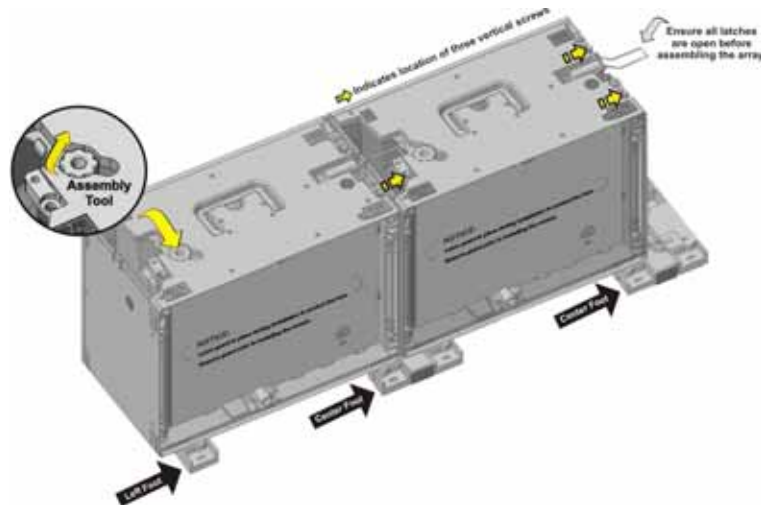


Figure 2-8 Assemble Second Tile in First Row

- Repeat Step 5 for all remaining tiles that are to be used in the first row, except for the last tile.
- Assemble a right leveling foot to the final tile in the row and secure it to the last tile in the first row (**Figure 2-9**). **NOTICE:** When installing an array without leveling feet ensure the surface underneath the array is flat. **DO NOT** use the vertical screws in the bottom row of installations without leveling feet to ensure the tiles sit flat.



Figure 2-9 Assemble Final Tile in First Row

8. Hand thread a horizontal adjustment screw (**Figure 2-10**) into the mounting points between the first two tiles (**Figure 2-10**). DO NOT completely tighten until the entire row is complete to allow for adjustments. **NOTICE!** *The horizontal adjustment screw is optional and is provided to aid in the fine optimization of the seams.*
9. Repeat Step 8 for every tile added to the first row. **NOTICE:** *It is recommended that M6 screws be installed on all other rows when assembling an array higher than three rows to ensure fine optimization of seams. For arrays that are three rows or less it is not necessary to install M6 screws; however, if you require fine optimization of the seams, horizontal adjustment screws are recommended on all rows.*

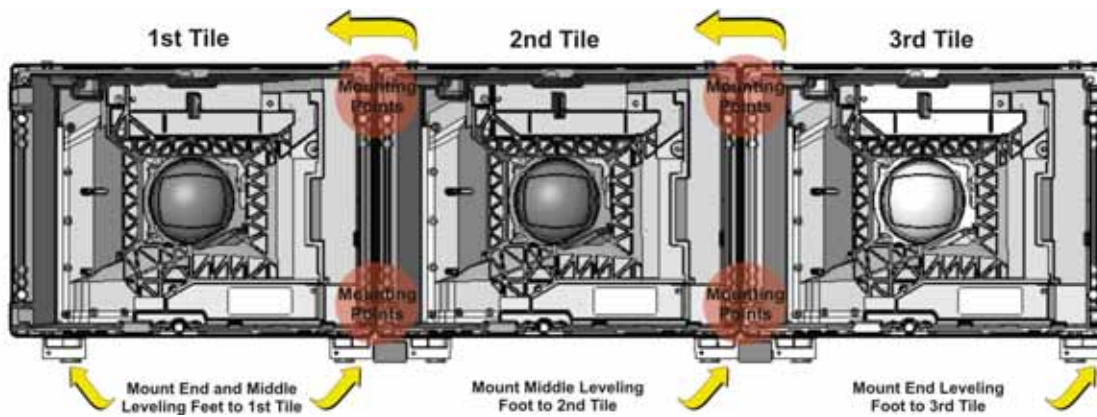


Figure 2-10 Construct the First Row of MicroTiles

10. Once the first row is assembled, place a straight edge onto the interface pads (**Figure 2-11**), along the top of each tile to ensure the row is flat. If needed, adjust the vertical screws (if mounted to leveling feet) and the horizontal adjustment screws. **NOTICE:** *Poor alignment of the first row limits the size of the array that can be built.*

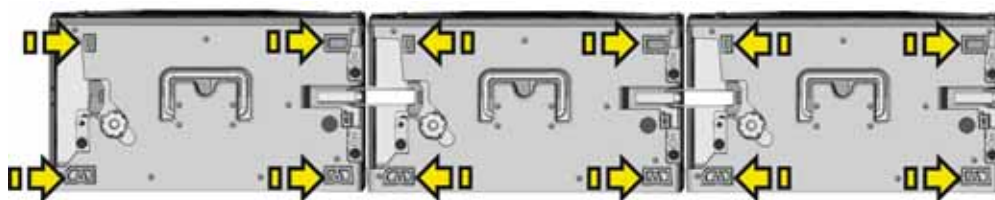


Figure 2-11 Interface Pads Along Top of MicroTiles

11. Snap and lock the side latch onto the adjacent tile. Repeat for every tile in the row.
12. If the array is mounted to leveling feet, use the assembly tool to completely tighten all vertical screws. Failure to properly tighten the vertical screws causes the tiles to be misaligned, making screen installation difficult.
13. Use a 5mm hex key to completely tighten all horizontal adjustment screws.
14. For instructions on how to add additional rows, refer to [2.3.5 Assemble Additional Rows, on page 2-10](#).

15. If the array is mounted to the leveling feet, insert shims into either the front or the back (or both) of each leveling foot to tilt the array or provide additional security. If necessary, fasten the leveling feet to the base structure.
16. **(Optional)** Fasten the grilles to the leveling feet, using the supplied fasteners. Refer to **Figure 2-4 Tools and Hardware**, on page 2-5.

2.3.5 Assemble Additional Rows

⚠ DANGER TIP LOAD! If the array is two rows or higher, additional hardware for tip resistance must be used in order to comply with safety regulations and local codes. Either use the rear tie points on the array or bolt the leveling feet into the base structure in such a way that the weight of each tile is individually supported. To accomplish this a mounting bracket can be purchased from Christie (P/N: 123-107109-xx).

⚠ DANGER If the array is mounted to the leveling feet, they must be fastened to an adequately ballasted base structure anytime the array is two rows or higher to prevent tipping and provide stability. The leveling feet come equipped with machined points for bolting the array down to a base, but the hardware is not supplied. Use M6 or 1/4" hardware and follow all local area standards and safety regulations when bolting the array.

NOTICE: It is advised that when an array is setup near a wall to connect the cables row by row. When setting up an array where the back is exposed, first setup the entire array and then connect the wires. For more information, refer to 2.3.8 Cable Routing, on page 2-12.

1. Ensure the latches on each tile are open before beginning (**Figure 2-7**).
2. Place a tile on top of the first tile in the bottom row (**Figure 2-12**) and push the tile back until the front edge of the tile is lined up with the front edge of the tile below.

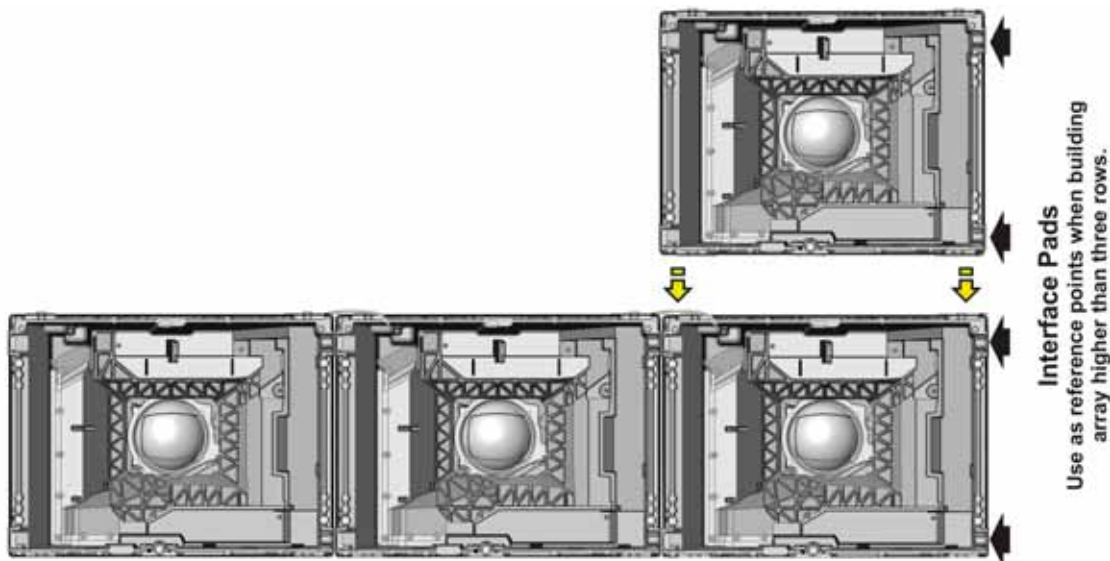


Figure 2-12 Assemble the Second Row

3. Once the tile is in place, use the assembly tool to hand-tighten the three vertical screws. DO NOT completely tighten at this point to allow for adjustments.
4. Continue to add the remaining tiles to the second row and repeat Step 3 for every tile added to the second row.
5. Once the second row is in place, use the assembly tool to completely tighten the vertical screws. Failure to properly tighten the vertical screws and horizontal adjustment screws causes the tiles to be misaligned, making screen installation difficult. **NOTICE:** *To avoid damaging the vertical screws do not overtighten them. Do not use power tools to install the vertical screws.*
6. It is recommended that horizontal adjustment screws be installed on all other rows when assembling an array higher than three rows. For arrays that are three rows or less it is not necessary; however, if you require fine seam optimization, horizontal adjustment screws are recommended on all rows.
7. Place a straight edge on the four interface pads along the side of the column to ensure the top and bottom tiles are straight (**Figure 2-12**). If needed, readjust the top tile or the first row until they are straight.
8. Snap and lock the side latches onto the adjacent tile.
9. Repeat the steps outlined above for every additional row added to the array.

2.3.6 Install Screens

NOTICES: **1)** Before installing the screens remove the lens guard from the tiles and the dust cap from the lens. Replace the lens guard and dust cap anytime the array is disassembled and shipped. **2)** Avoid touching the screen surface. Always handle from the sides. Remove all hand jewelry before handling the screens. For cleaning instructions, see [Section 4 Maintenance](#). **3)** A minimum clearance of 20mm must be provided in front of the screen in order to allow it to protrude in the event of the thermal actuator being activated. For details, refer to [2.5 Thermal Actuator, on page 2-14](#).

1. Pull the screen tether out of the top of the tile housing and hook it into the locking latch on the screen (**Figure 2-13**). The tether ensures the screen does not fall if subjected to excessive force/vibrations.
2. To attach a screen, line up the two mounting holes on the screen with the two pins on the tile and carefully press onto the tile. Magnets on the housing secure the screen to the tile.
3. It is recommended that the screens be installed starting from the bottom of the array.

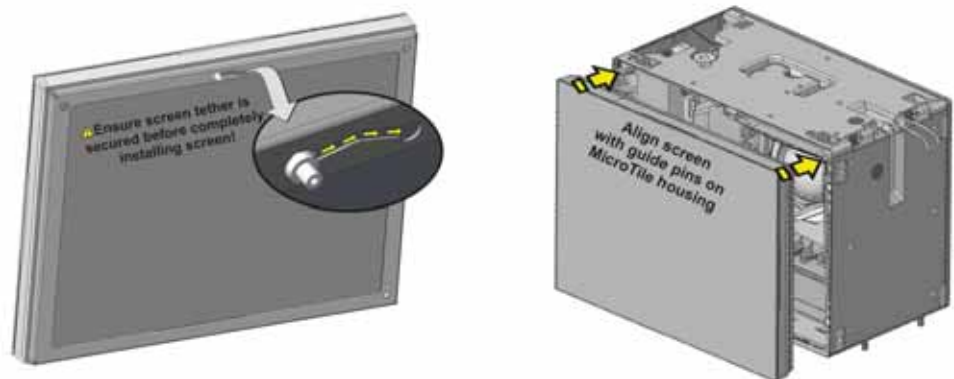


Figure 2-13 Screen Installation

2.3.7 How to Remove Screens

NOTICE: To avoid damaging the screen ensure the surface of the screen removal tool is clean and free of debris.

1. Open the handle on the screen removal tool (**Figure 2-14**) and gently place it in the center of the screen.
2. Carefully, push the screen removal tool towards the screen using moderate pressure.
3. Close the handle on the screen removal tool to apply suction.
4. To remove the screen, carefully pull on the screen removal tool.



Figure 2-14 Screen Removal Tool

2.3.8 Cable Routing

NOTICES 1) It is not necessary to make a complete loop; however, if you create a complete loop, communication to the entire MicroTiles array is not lost if one tile fails. **2)** It is advised to connect the cables row by row when an array is setup near a wall. When setting up an array where the back is exposed, first setup the entire array and then connect the cables. **3)** Ensure there is sufficient slack in the cable to allow servicing of the tile from the front. **4)** DO NOT tie wrap or secure the cabling if the array is setup near a wall.

1. Plug the display port cables into either of the two ports on the back of the tiles (**Figure 2-15**). Either port is acceptable on both the ECU and the tile unless connecting multiple ECUs. When using multiple ECUs, HSSL-1 is the local source input and HSSL-2 is the local source output. For details, refer to [2.2 Cabling and ECU Layout and Design, on page 2-2](#).
2. Daisy chain the cable from one tile to the next and plug the last one back into the ECU. **NOTE:** The display port cable has a built in retention latch. When disconnecting the cable, the latch must be pressed down in order to avoid damaging the cable (**Figure 2-15**).



Figure 2-15 Display Port Cable

2.4 Cooling

⚠ CAUTION A minimum 2" (50mm) gap must be left at the back of all arrays to ensure proper air flow and cooling.

If the array is installed in an enclosed area, additional cooling may be required in order to comply with safety regulations and local codes. Each tile requires 70 CFM (33L/s) of in/out cooling air. The maximum cooling load is 110W (375 BTUs/hr) per tile when operating at full brightness. The inlet air cannot exceed the maximum operating temperature of the tile. For details, see **6.1.7 Operating Specifications, on page 6-2**. If proper air flow is not provided the tiles continue to operate for a limited time. Temperature limitations can be adjusted through the WebUI. If the tiles exceed the preset temperature, it will dim. If it operates at or above that temperature for too long, the tile will power down. For details, see to **3.11.3 System Information - Tiles, on page 3-45**.

NOTICE: The surrounding air supply *MUST* be clean and free of excessive dirt, dust and particles in order to ensure proper functionality of the MicroTiles. Failure to ensure a clean air supply may void the warranty.

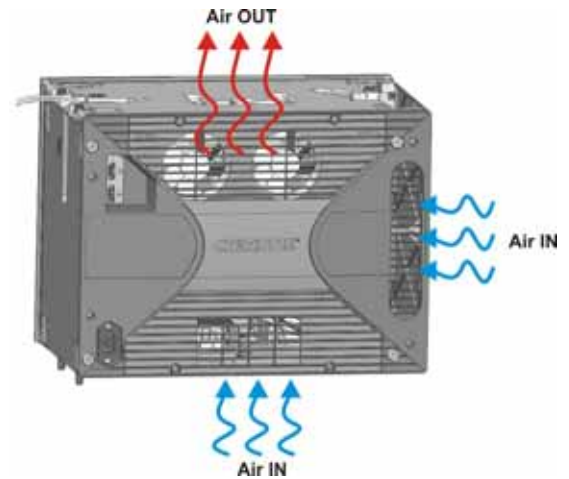


Figure 2-16 Air Intake/Outtake

2.5 Thermal Actuator

NOTICE: A minimum clearance of 20mm must be provided in front of the screen in order to allow it to protrude in the event of the thermal actuator being activated.

Each tile features a thermal actuator which activates when it reaches 40 degrees Celsius. The thermal actuator is a mechanical device and is not controlled electronically. When activated, the actuator extends, pushing the bottom of the screen a small distance away from the display unit, thereby releasing any pressure build-up between screens due to screen expansion at high temperatures. When the temperature of the actuator returns below 40 degrees Celsius, it retracts, pulling the screen back into place.

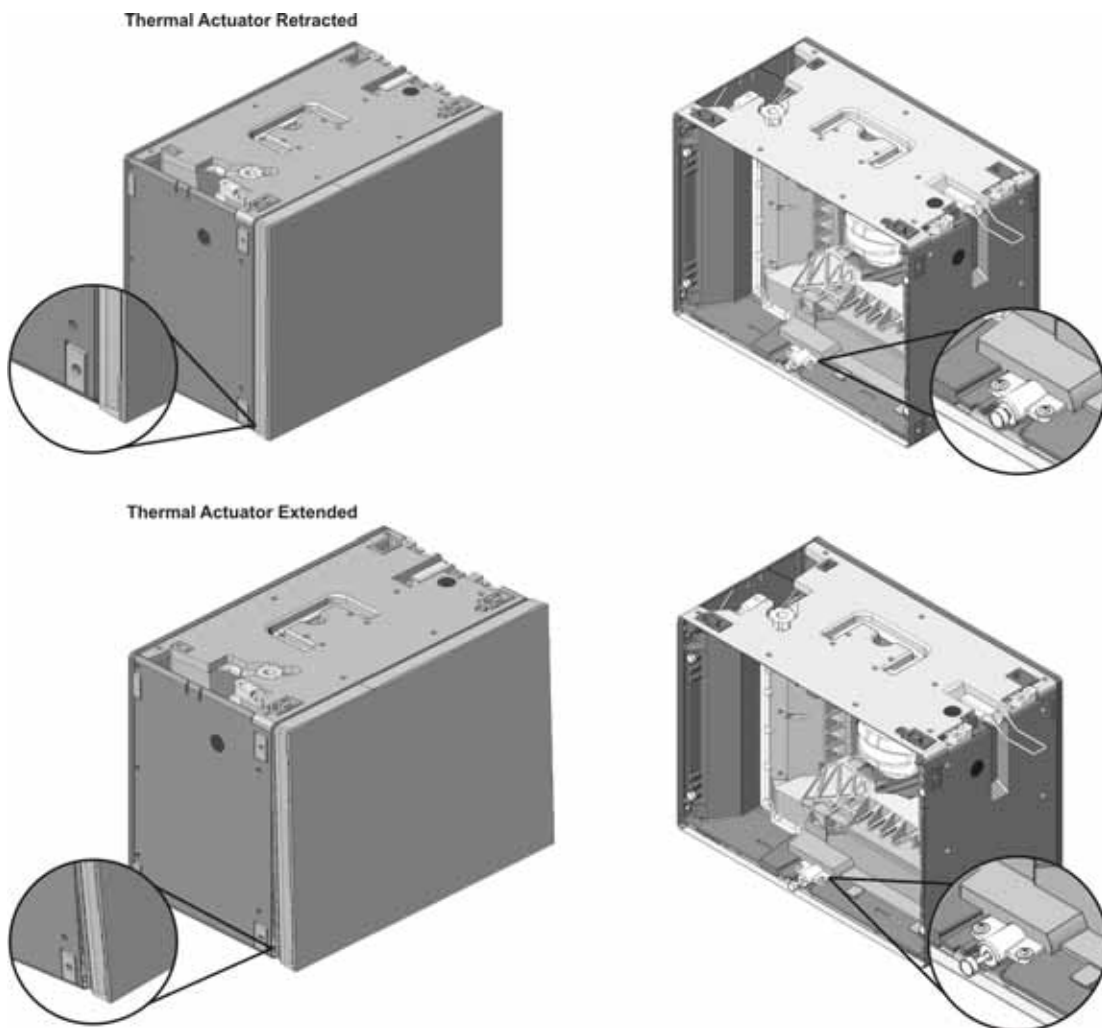


Figure 2-17 Thermal Actuator Retracted and Extended

2.6 Mounting Orientations

NOTICE: MicroTiles can be mounted in a variety of orientations with the following limitations:

- **Angle Mounting:** Mounting brackets can be installed on each tile to allow angle mounting. The maximum incline supported is $\pm 20^\circ$.
- **Floor Mounting (facing up):** This is supported; however, the tiles cannot bear weight in this orientation.
- **Ceiling Mount (facing down):** This is supported; however, the mounting support system and the mounting surface must be evaluated and accepted by local authorities according to local standards and safety regulations.

Four M6 female threaded bosses are located on the back of each tile for wall and ceiling mount purposes (**Figure 2-18**). For wall mounting a thread engagement of 16-18mm is required. For ceiling mounting use M6 bolts (property class 12.9 - plain finish) applied with 14 Nm of torque and a minimum thread engagement of 13mm. Each mounting boss on the tile can support up to 356N of force. **NOTE:** *The hardware for this is not supplied. Follow all local standards and safety regulations.*

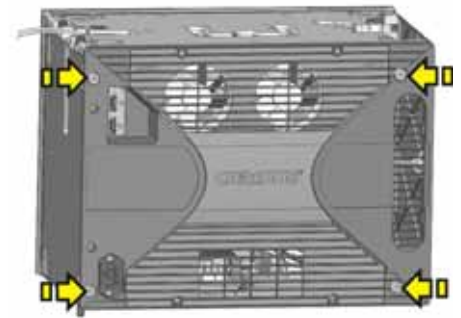


Figure 2-18 Wall and Ceiling Mounting Points

2.7 Connecting Sources

NOTICE: *The WebUI is only functional on the master ECU. It does not communicate with slave ECUs.*

A MicroTiles array requires an ECU (**Figure 2-19**). This product allows the end user to display an image using a source connected via a DVI-D cable. It acts as the controller and ensures the supplied video signal is properly displayed across the entire array. Once the ECU is connected and powered up, the video content is enabled by default as long as the video source is connected to the DVI-D connection. It also monitors the health of the array. In a more complex setup, multiple ECUs can be utilized. For details on controlling an array with multiple ECUs, refer to [2.7.2 Connect to Power, on page 2-18](#). When multiple ECUs are connected into a single array, an arbitration scheme is used to ensure only one ECU acts as the main system controller (master ECU) and the video source connected to this ECU is always capable of playback on all tiles. Each slave ECU will playback it's video source to the connected tiles; it cannot playback the local video from another ECU to it's connected tiles.

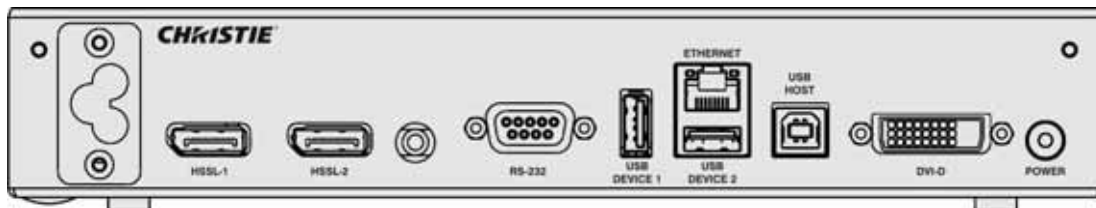


Figure 2-19 ECU Features

NOTICE: *Up to 7m (20 ft.) of long distance communication between the ECU and the tiles is supported at this time.*

- **Power Connector:** Each ECU comes with a universal power supply (110V-240V, 50Hz/60Hz) power splitter cable, which forms a T-junction. One end of the ‘T’ plugs into the back of the ECU and the other two ends form a daisy chain with either another ECU or with a tile.
- **Power Button:** Press to switch the ECU and any attached MicroTiles array between the ON and STANDBY states. The bi-colored LED flashes green when the system is in the ON state and red when the system is in STANDBY. If any error occurs the LED flashes red. **NOTES: 1)** *If the power button LED is red and the power connector cord is unplugged, the ECU will remain in a standby state even when the power cord is reconnected.* **2)** *The Power button can also be used to display the WebUI IP address on the master ECU in multiple-ECU configurations or to pair a remote control. Simply press and hold the Power button for 5 seconds. For details, refer to [3.4 R100 Remote Control, on page 3-3](#).*
- **HSSL-1 and HSSL-2:** These two bi-directional ports are capable of carrying 5Gbps of video and data in both directions, simultaneously. The ECU is connected via the HSSL interface directly to a tile. The order in which system elements are connected is not significant unless you are connecting multiple ECUs. When connecting multiple ECUs, HSSL-1 is the local source input and HSSL-2 is the local source output.
- **RS-232:** Connect with a laptop or PC for access to all controls and all system status information.
- **USB Device 1/USB Device 2:** Reserved for future use.
- **Ethernet:** A host computer connected to this interface has full access to all controls and all system status information. All firmware can be updated via this port. This interface supports 10-BaseT and 100-BaseT. A

web client interface is available through this port and is used as the primary human interface for remote PC based control of a MicroTiles installation. There are 2 methods of connecting via this port:

- **Direct Cable:** The PC must be assigned a static IP Address 192.168.0.x where x is any integer 2 through 254; at the factory, the IP of the ECU will be 192.168.0.1
- **Router or Switch:** Press and hold the **Power** button to display the IP Address to which the web browser will be connected.
- **USB Host:** Reserved for future use.
- **DVI-D:** Connect a variety of progressive video and graphics sources to the DVI-D port. The bandwidth of the input is limited to between 25 MHz and 165 MHz.

2.7.1 Displaying Content

1. Connect the DVI-D output from the video source (i.e., media player) to the DVI-D input on the ECU (Figure 2-20).
2. Once the DVI-D is connected and the ECU is powered up, the video is enabled by default. Use the R100 Remote Control to control the video content through the On Screen Display (OSD). For details, refer to [3.4 R100 Remote Control, on page 3-3](#).

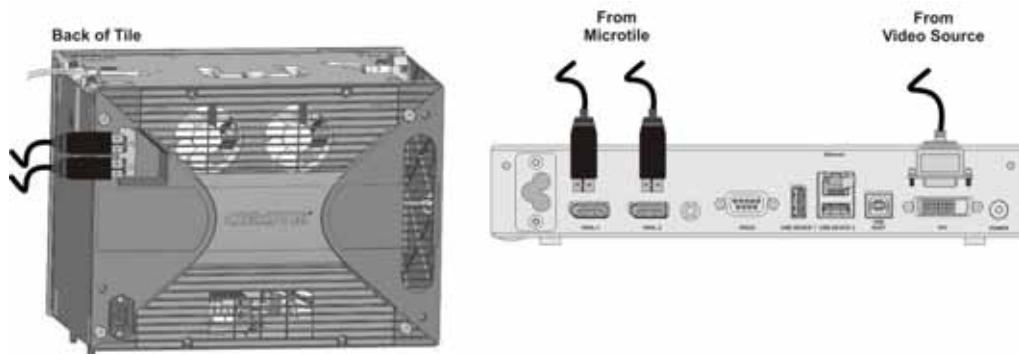


Figure 2-20 Connecting Sources

2.7.2 Connect to Power

⚠ WARNING The North American rated line cord is provided with each MicroTiles Setup Kit (P/N:123-104106-xx). For all regions ensure you are using a line cord, power plug and socket that meet the appropriate rating standards. Connect the power cable to the AC receptacle at the lower-left corner on the rear of the tiles and to a proper AC power source (outlet). **DO NOT** attempt operation if the AC supply and cord are not within the specified voltage and power range. The appropriate ratings for the MicroTiles are listed on the licence label (located on the back of the tile).

⚠ WARNING Electrical Hazard! A maximum of nine tiles may be connected per daisy chain. This is the maximum power carrying capability of the power cord. In an array of 12 tiles, two outlets and two power bars should be used.

Power Distribution

NOTICES: **1)** Local or national regulations may not allow the use of Y power cords and may require standard individual power cords for each tile. This may include Japan, China and Korea. **2)** If you are constructing an array without the leveling feet, directly onto an existing surface you must connect the standard connection to the tile and not the 90° connection. Plugging the 90° connection interferes with the mounting surface.

- Each tile comes equipped with a captive “Y-Splitter” power cord. A quantity of nine cords are shipped with each Setup Kit (P/N: 123-104016-xx).
- Multiple tiles are daisy chained to a single power feed.
- Up to nine tiles per chain can be supported.

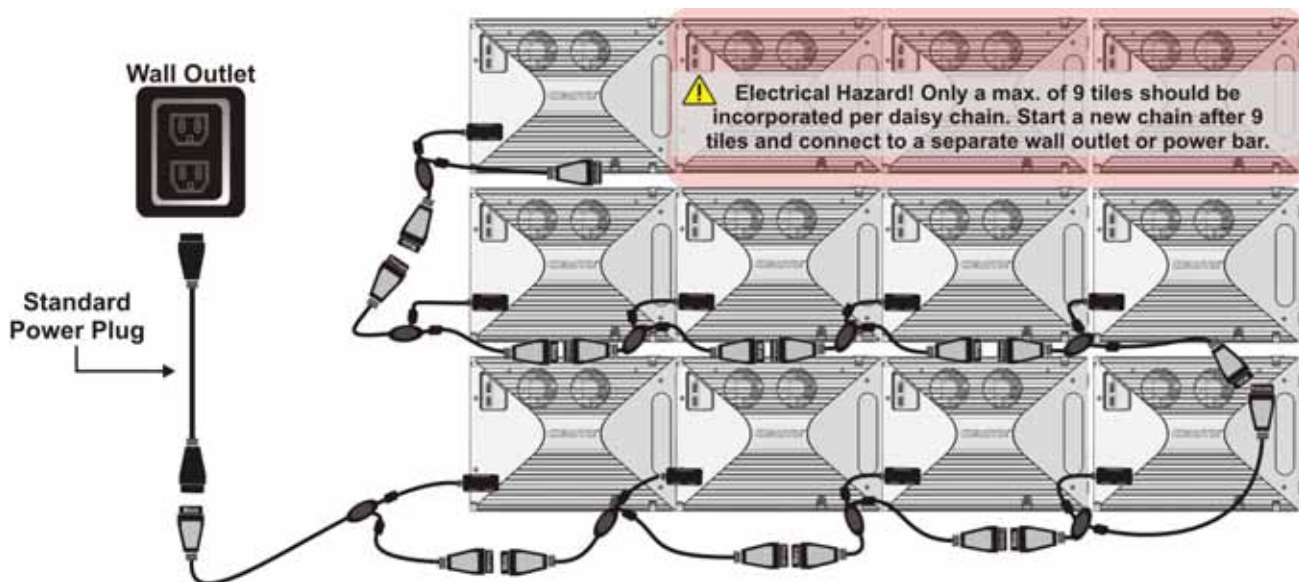


Figure 2-21 Connecting to Power Using Y-power Cords

Install Security Clip onto Power Connection

To ensure the power cord is secured to the tile's power connection a security clip, supplied with the Setup Kit (P/N: 123-101106-01) must be installed. To install insert the end of the clip into the two machined holes on the two posts (**Figure 2-22 - Top**). If connecting the 90° connection to the tile ensure the clip locks from the left-side and if using the standard connector ensure it locks from the right-side. See **Figure 2-22 - Bottom**.

Power ON

1. Connect the power plug from the ECU into an outlet or power bar.
2. Daisy chain the 'Y' power cords into each tile in the array and connect the standard power plug into an outlet or power bar (**Figure 2-21**).
3. Apply electrical tape or tie wraps to secure the inline connection between the Y-power cords.
4. Push the **Power** button ON at the ECU. The LED status light on the button turns green when the system is ready.
NOTE: *It is recommended that a power bar with an in-line power switch be used to simplify switching the array ON and OFF. If any of the tiles fail to power up check each connection.*

Power Down

1. Push the **Power** button OFF at the ECU.
2. Move the power bar switch to the OFF position or disconnect the power plug from the outlet.

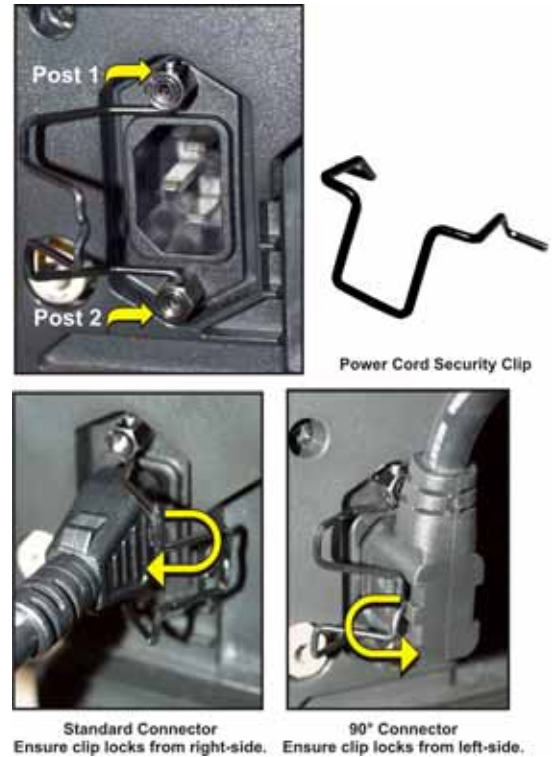


Figure 2-22 Power Cord Security Clip

2.8 Disassembling a MicroTiles Array

NOTICE: Always replace the lens guard and dust cap when tearing down a MicroTiles array.

1. Power down and disconnect all power cables and display port cables.
2. Use the supplied suction cup to remove the screens from each tile and release the screen tether. For details, refer to [2.3.7 How to Remove Screens, on page 2-12](#).
3. Replace the lens guard and dust cap.
4. Loosen the three vertical screws from the top row using the assembly tool.
5. Unhinge all the latches from the top row.
6. Remove each of the Christie MicroTiles from the top row.
7. Repeat Steps 2 to 6 for all remaining rows. **NOTE:** If the horizontal adjustment screws were used in building the array, make sure they are removed. If necessary, remove the leveling feet.

3 Operation

3.1 Powering Up the MicroTiles Array

⚠ WARNING A North American rated power cable is provided with each MicroTiles Setup Kit (P/N: 123-104106-xx). For all other regions, make sure that you are using a power cable, power plug and socket that meet the appropriate rating standards. Connect the power cable to the AC receptacle at the lower-left corner on the rear of the tiles and to a proper AC power source (outlet). The outlet must be near the equipment and easily accessible. Use the power cable provided with the MicroTiles or an appropriately rated power cable that complies with regional standards. **DO NOT** attempt operation if the AC power source is not within the rated voltage range as specified on the licence label (found on the back of the tile).

NOTICE: A maximum of 9 tiles may be connected per daisy chain. In an array of 12 tiles, 2 outlets and 2 power bars should be used.

1. Connect the power plug from the ECU into an outlet or power bar.
2. Daisy chain the ‘Y’ power cords into each tile in the array and connect the standard power plug into an outlet or power bar. For more information on how to connect the power cords refer to [2.7.2 Connect to Power, on page 2-18](#).
3. Apply electrical tape or tie wraps to secure the inline connection between the Y-power cables. The LED status light on the ECU **Power** button is red during the power up sequence which takes approximately 1 minute. **NOTE:** *It is recommended that a power bar with an in-line power switch is used to simplify switching the array ON and OFF. If any of the tiles fail to power up, check each connection.*
4. Once the array (ECU and tiles) is powered up, the LED status light on the ECU **Power** button flashes green.
5. Refer to [2.7 Connecting Sources, on page 2-16](#) for information on how to display content onto the MicroTiles array.

3.1.1 If a Display Unit Fails to Power Up

- Check to ensure each cable is properly connected.
- Cycle power to the failed tile(s) or the entire array using the switch on the power bar.
- Check the LED on the back of each tile. A flashing green light indicates power is enabled.

3.2 Powering Down the MicroTiles Array

1. Push the **Power** button OFF at the ECU.
2. Move the power bar switch to the OFF position or disconnect the power plug from the outlet.

3.3 Status Indicators

The ECU is equipped with a status LED built into the **Power** button.

Table 3.1 ECU LED Indicator

LED Mode	Description
OFF	No Power
Green	Slave ECU (NOTE: <i>only 1 ECU can be the Master ECU</i>)
Green: Flashing	Master ECU
Red: Solid	ECU in Standby mode or Booting on Power Up
Red: Flashing	Failure detected.

Each tile is equipped with a tri-color LED, located on the back of the tile, which indicates power status.

Table 3.2 MicroTiles LED Indicator

LED Mode	Description
OFF	No Power
Amber	Power ON, Hardware is Good, No Firmware
Green	Power ON, Hardware is Good, Firmware is Good
Green: Flashing	Power ON, Hardware is Good, Firmware is Good, Communicating with ECU
Red: Solid	Power ON, No Hardware
Red: Flashing	Failure detected.

3.4 R100 Remote Control

This radio frequency remote control is used to navigate the menu commands on the OSD from up to 100m (328ft) away.

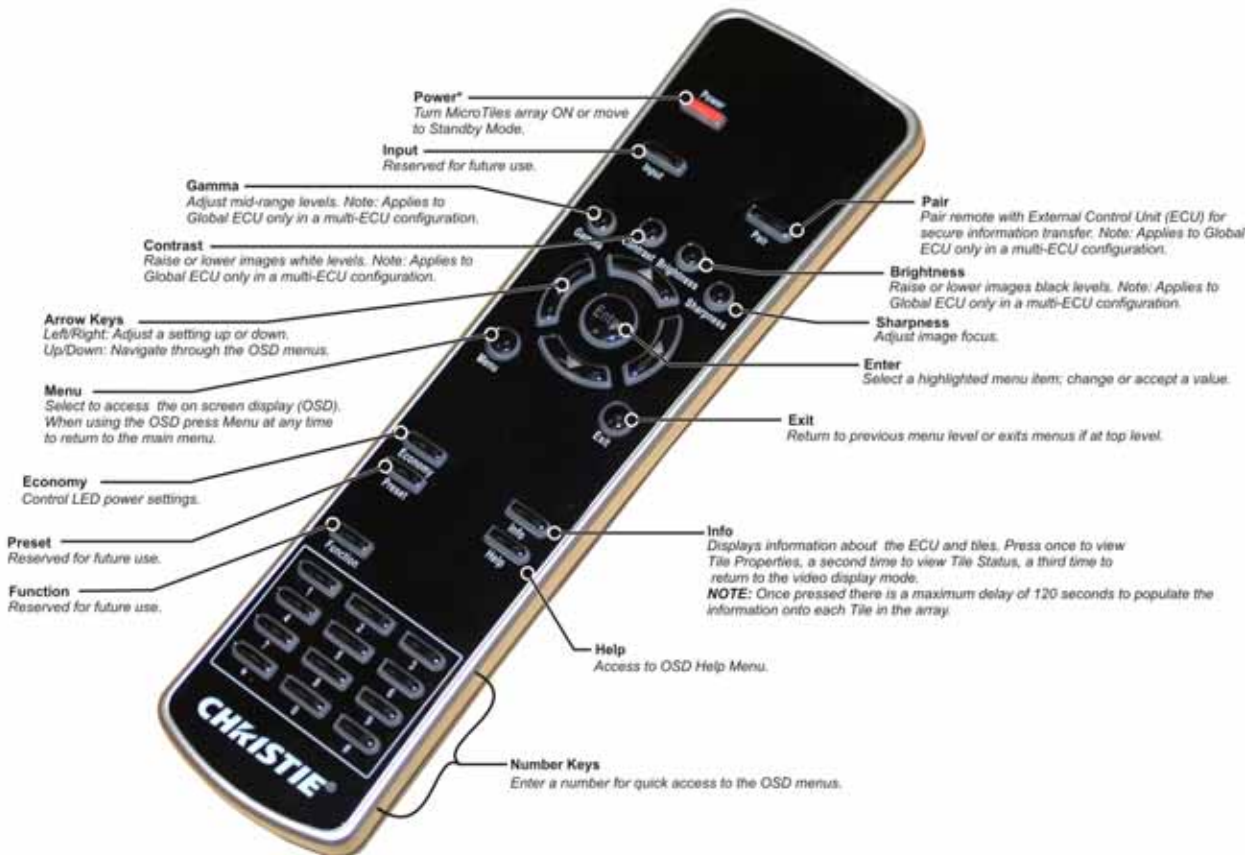


Figure 3-1 R100 Remote Functionality

3.4.1 Guide to Keypads

The remote keypad controls the tiles via communication from a battery-powered RF transmitter. Press the arrow keys down once for each continuous adjustment/movement in one direction. If a key is pressed while the tiles are still responding to a previous action, such as during power up, the second key press may not take effect. These are toggle keys, which require you to press once or press twice or use the up/down arrow keys.

NOTES: **1)** *There are no simultaneous key combinations; press keys one-at-a-time.* **2)** *Two AAA batteries are required (initially included in the Setup Kit).* **3)** *The keypad on the remote remains lit when the batteries are running low.*

3.4.2 Keypad Commands

Power

Press the **Power** button on the R100 Remote Control to toggle the array ON. The LED light on the ECU turns green when power is enabled. Press again to place the ECU in STANDBY mode. The LED light on the ECU turns red when the array is in STANDBY mode. **NOTE:** *This is not a complete powered down state. To completely disable power turn the array OFF at the power source.*

Input

Reserved for future use.

Pair

Press to pair the remote with the ECU for secure information transfer. For more information, refer to [3.4.3 Pairing the Remote to the ECU via the OSD, on page 3-6](#).

Contrast

Changes the level of peak white in the image. Use the **Left/Right Arrow** keys to reach the desired level of contrast. For best results, start low and increase so that whites remain bright, but are not distorted or tinted and to avoid light areas from becoming fully white (i.e., “crushed”). Low contrast causes dim images. Press **Enter** to apply changes.

Brightness

Increases or decreases the black level in the image. Use the **Left/Right Arrow** keys to reach the desired level of brightness. For best results, start high and decrease so that dark areas do not become fully black (i.e., “crushed”). Overly high brightness changes black to dark gray, causing washed-out images. Press **Enter** to apply changes.

Gamma

Determines how gray shades are displayed between minimum input (black) and maximum input (white) for a given amount of signal. The proper setting helps maintain optimized blacks and whites while ensuring a smooth transition for the “in-between” values utilized in grays. Unlike brightness and contrast controls, the overall tone of an image can be lightened or darkened without changing the two extremes. The images will be more vibrant with good detail in dark areas when using the Gamma control. The nominal setting for Gamma

Correction is 2.22 for most signals and conditions. If excess ambient light washes out the image and it becomes difficult or impossible to see details in dark areas, increase the gamma correction setting to compensate. Once the desired gamma level is established, press **Enter** to apply the changes.

Sharpness

Increases or decreases the sharpness settings of the image. Use the **Left/Right Arrow** keys to reach the desired sharpness level.

Arrow Keys

Use the **Left/Right arrow** key to change a slide bar value.

Enter

Press to apply any changes made through the OSD to the array.

Menu

Press to enter the OSD. Once you are working within the OSD you can press at any time to return to the main menu.

Exit

Press to return to the previous level or menu.

Economy

Press for a shortcut to the **Array Management>Array Settings** menu, which is used to control the LED power settings. For details, refer to [3.5.5 OSD Canvas Management Menu, on page 3-10](#).

Info

Press once to display the tiles' properties on each tile. Press again to display the tiles' firmware version on each tile. Press again to exit to video. Once pressed there is a maximum delay of 30 seconds to populate the information onto each tile in the array.

Preset

Reserved for future use.

Number Keys

Use the number keys for quick access to the OSD menus.

Function

Reserved for future use.

Help

Press to access the Help menu.

3.4.3 Pairing the Remote to the ECU via the OSD

The remote must be paired with the master ECU in order for it to communicate with the MicroTiles array.

NOTES: **1)** *Pairing does not function with slave ECUs.* **2)** *Only one remote can be paired with the master ECU.*

The following instructions outline how to pair the remote through the OSD. For information on how to pair the remote using the WebUI, refer to [Remote Pairing via the WebUI, on page 3-41](#). **NOTE:** *Before attempting to use the OSD via the remote control, you should wait approximately 30 seconds after a video signal appears on the array to ensure enough time has passed for the firmware to start correctly. Otherwise, the OSD menu will appear on the wrong tile(s).*

Remote Pairing via the OSD

1. Press and hold the **Power** button on the ECU for approximately five seconds until the screen shown in **Figure 3-2** appears. **NOTE:** *If the remote is not paired within 30 seconds the application times out, the message A remote control could not be detected appears on the display for 3 seconds and the OSD will return to video.*

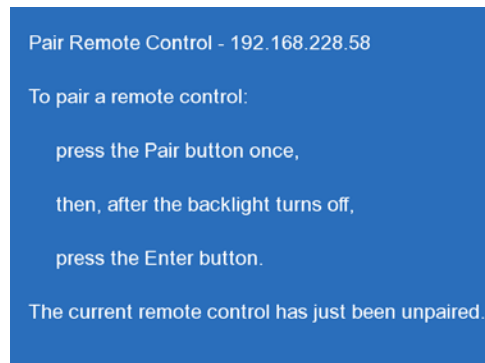


Figure 3-2 Pair Remote Control

2. Press the **Pair** button on the R100 Remote Control and then the **Enter** button. Once pairing is successful, the screen shown in Figure 3-3 appears on the OSD. **NOTE:** *If the **Pair** button is accidentally pressed on the remote when the array has been paired, press it again to toggle pairing mode OFF.*

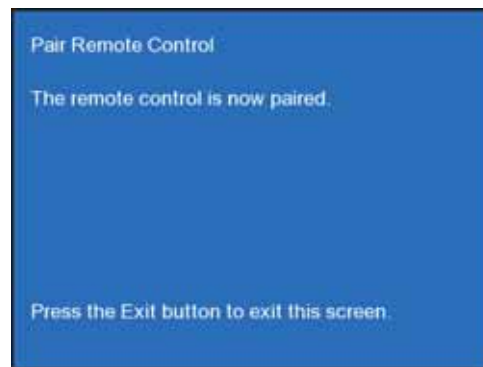


Figure 3-3 Remote is Paired

3.5 Using the On-Screen Display (OSD)

3.5.1 OSD Functionality

- Adjust display window offsets
- Specify Video or OSD display mode
- Disable and enable automatic mapping/configuration of the array
- View input properties, which includes:
 - DVI Clock
 - Input
 - Pixel Width
 - Pixel Height
 - Frames per Second
- Display a test pattern
- Select all tiles in an array
- Calibrate all tiles in an array
- Turn the tiles array ON and OFF
- Reset the ECU
- Set date and time
- View the status of the tiles and ECU (i.e., properties, firmware versions, IP address, etc.)
- Help menu

3.5.2 OSD Guidelines

NOTE: *There are no simultaneous key combinations; press keys one-at-a-time.*

- Pause briefly between key presses to allow the tiles to respond to the previous action.
- Press **Exit** once to cancel a selection or go back one level in the menu.
- If the back light turns OFF, push any key to turn it ON again.

NOTE: *If the OSD and WebUI are used simultaneously, the OSD menus may not display correctly. If a menu button is pressed but does not appear on the display after a few seconds, press the **Exit** key several times and re-enter your selection(s).*

3.5.3 Navigating the OSD Menus

To access the OSD press **Menu** from the R100 Remote Control. Basic controls of the tiles are accessed from within the OSD menu system. When the OSD is activated, it appears on the top-left tile in a mapped array and anywhere if the array is unmapped. All other tiles in the array remain on video. With the Main menu displayed (**Figure 3-4**), either use the arrow keys on the remote to highlight the desired option and press **Enter**, or use the number keypad on the remote to make the corresponding selection. The corresponding menu will appear. To scroll through a list of items, use the up/down arrow keys. Press **Exit** once to return to the previous level of options. Press **Menu** at any time to return to the Main menu. For a detailed overview, see [Appendix A: OSD Menu Tree](#).



Figure 3-4 OSD Main Menu

3.5.4 OSD Source Management Menu

This menu (**Figure 3-5**) allows users to enable/disable the active input source, view and edit the properties of the active input source and display window, and adjust image brightness, color temperature, contrast, gamma and sharpness. Press **Menu** and use the arrow keys to highlight **Source Management** from the **Main** menu. Press **Enter** to access the menu selections (**Figure 3-5**). For quick access to this menu press **Menu** and then **1** from the remote. For a detailed description of the same controls accessible from the WebUI, refer to [3.8 WebUI Source Management Menu](#), on page 3-17.

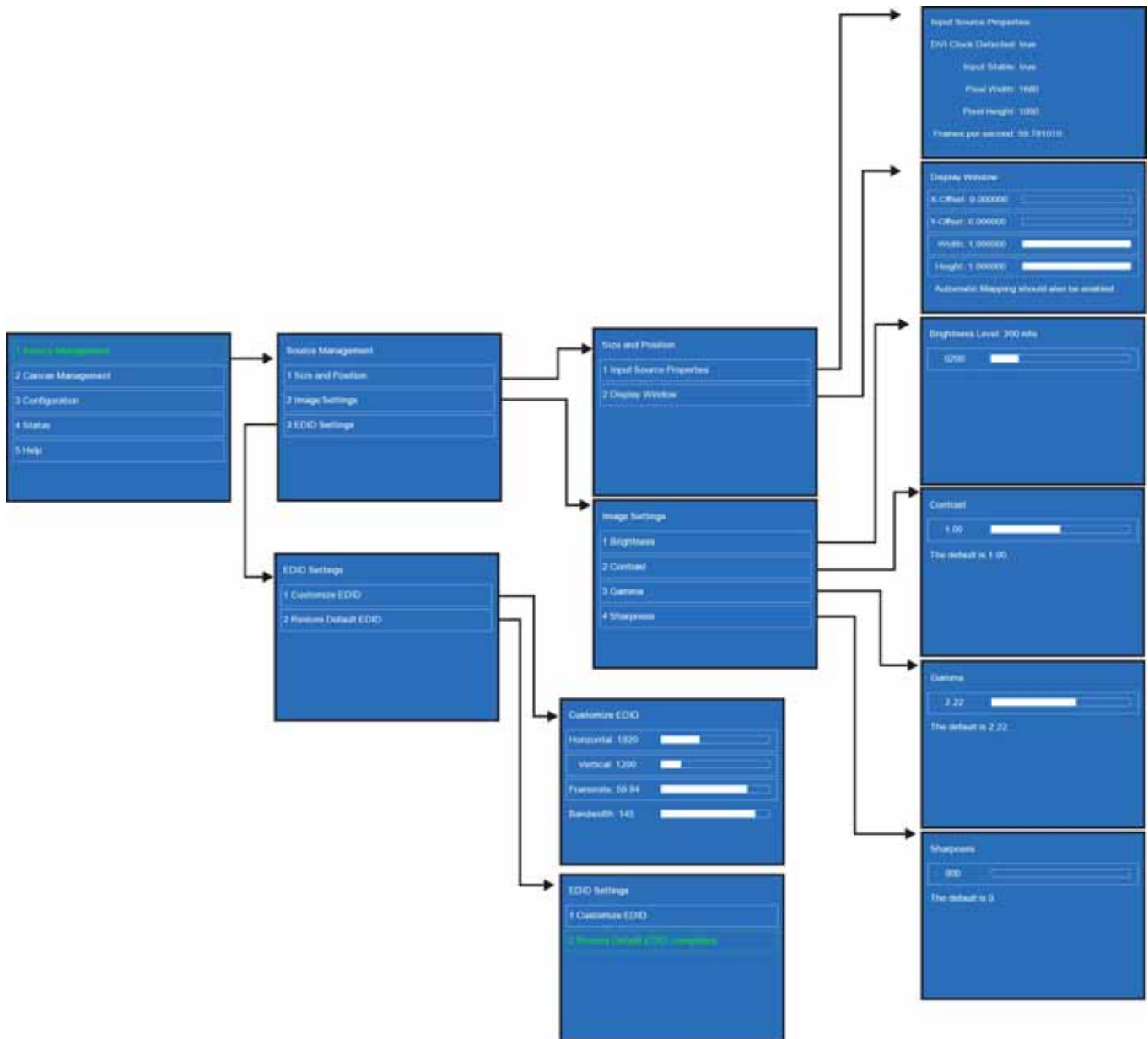


Figure 3-5 OSD Source Management Menu

3.5.5 OSD Canvas Management Menu

This menu (**Figure 3-6**) enables users to select the video signal for displaying content onto the tiles. It also allows users to enable/disable automatic mapping or to adjust display settings, such as intensity, color matching, mullion reduction and uniformity correction. Use the **Canvas Settings Menu (Figure 3-7)** to adjust color settings. Use the **Diagnostics and Calibration menu (Figure 3-8)** selection to select from a list of test patterns used for troubleshooting and setup purposes. Press **Menu** and use the arrow keys to highlight **Canvas Management** from the **Main** menu. Press **Enter** to access the selections. For quick access to this menu press **Menu** and then **2** from the remote. For a detailed description of the same controls accessible from the WebUI, refer to [3.9 WebUI Canvas Management Menu, on page 3-22](#).

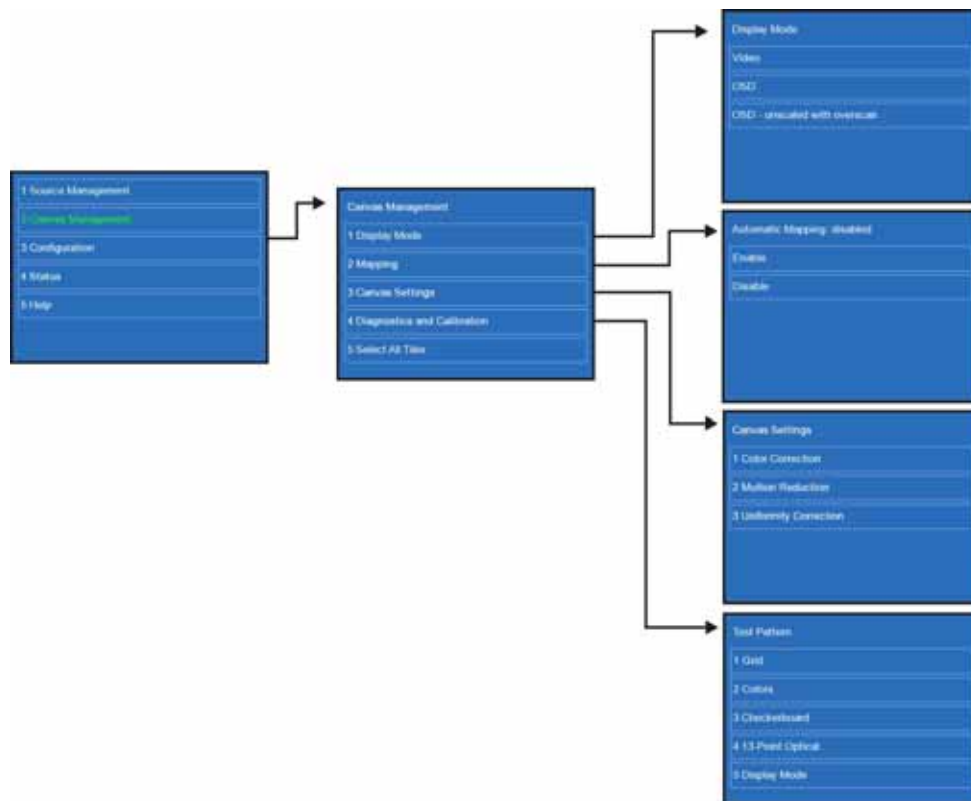


Figure 3-6 OSD Canvas Management Menu

OSD Canvas Management Menu Continued>Canvas Settings

Use the **Canvas Settings** Menu to adjust the color settings, which includes brightness levels, uniformity correction and mullion reduction. Press **Menu** and use the arrow keys to highlight **Canvas Management** from the **Main** menu. Press **Enter** to access the **Canvas Settings** menu (Figure 3-7).

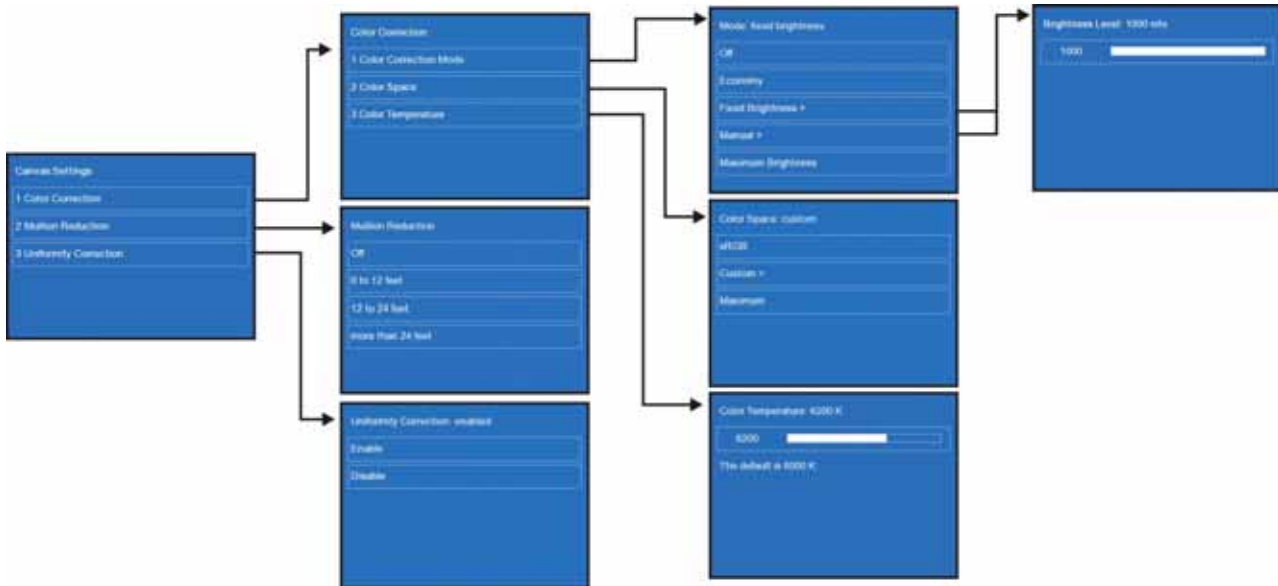


Figure 3-7 OSD Array Management Menu>Canvas Settings

OSD Canvas Management Menu Continued>Diagnostics and Calibration

Use the **Diagnostics and Calibration** menu selection to select from a list of test patterns used for troubleshooting and setup purposes. Press **Menu** and use the arrow keys to highlight **Canvas Management** from the **Main** menu and select **Diagnostics and Calibration**. Press **Enter** to access the **Test Pattern** menu (**Figure 3-8**).

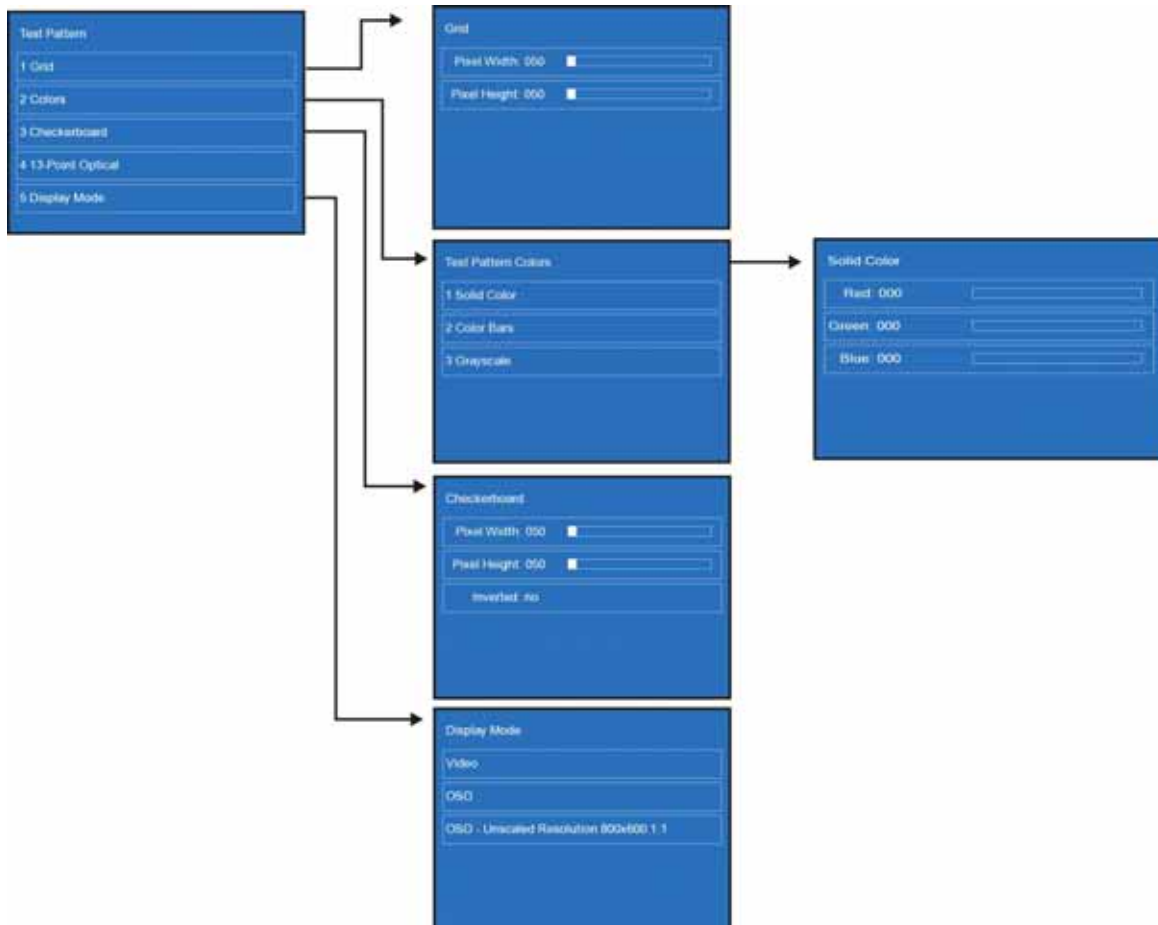


Figure 3-8 OSD Array Management Menu>Diagnostics and Calibration

3.5.6 OSD Configuration Menu

The Configuration menu (**Figure 3-9**) allows users to control power and reset the ECU and tiles. Typically, the ECU and tiles need to be reset after a firmware upgrade. **NOTE: Slave ECUs cannot be reset, powered ON or OFF from the firmware or the remote.** Use the **Left/Right** arrow keys on the remote to adjust the date/time fields via this menu. For a detailed description of the same controls accessible from the WebUI, refer to [3.10 Configuration Menu, on page 3-35](#).

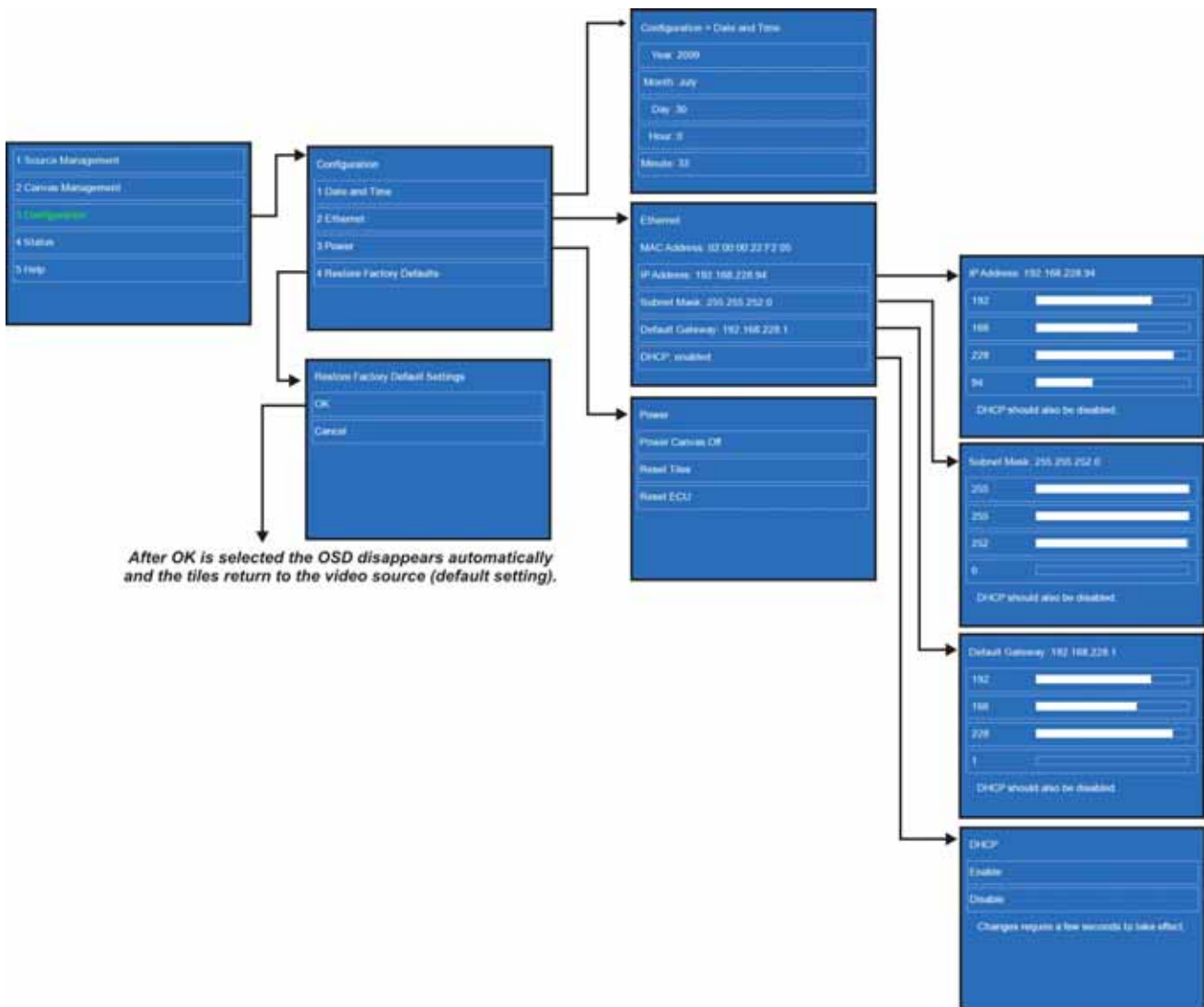


Figure 3-9 OSD Configuration Menu

NOTE: If the ECU was disconnected, the message; Waiting for system master. Going to standby in 5 minutes, appears on the OSD. To avoid going into STANDBY mode re-connect the ECU.

3.5.8 OSD Help Menu

This menu (**Figure 3-11**) provides additional support for the OSD menu system. The **About MicroTiles OSD Firmware** selection provides firmware licence information.

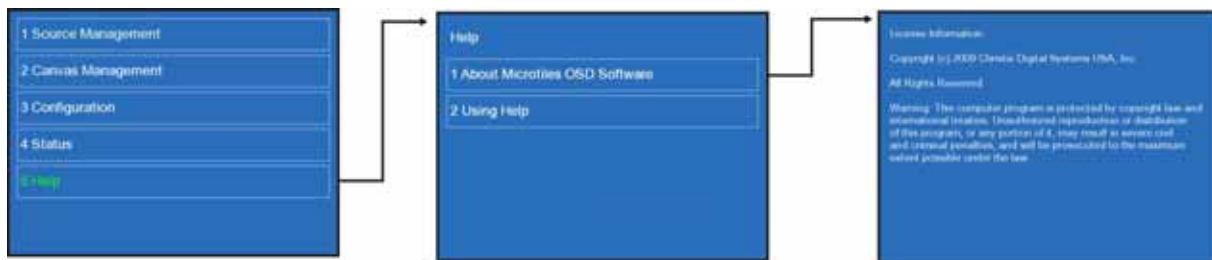


Figure 3-11 OSD Help Menu

3.6 Using the Web User Interface (WebUI)

In addition to using the OSD, MicroTiles can also be controlled remotely, typically at a controller such as a PC, via a WebUI on an Ethernet network. If there are concerns about network security, run the WebUI on a local area network only and install a firewall.

3.6.1 Recommended System Requirements

- 1.6 GHz Intel Atom CPU
- 1 GB RAM
- Graphics adapter with 1024 x 768 resolution *** must support application window size of 800 x 600*
- Ethernet connection *** minimum recommended speed of 1.5 Mbps*
- Supported operating system, such as:
 - Microsoft Windows XP or Vista,
 - MAC OS X Leopard
 - Linux
- Supported web browser, such as:
 - Microsoft Internet Explorer version 7 and higher
 - Apple Safari version 3 or higher
 - Mozilla Firefox version 3 or higher
 - Adobe™ Flash Player Plug-In 9 or higher

3.6.2 WebUI Menu Tree

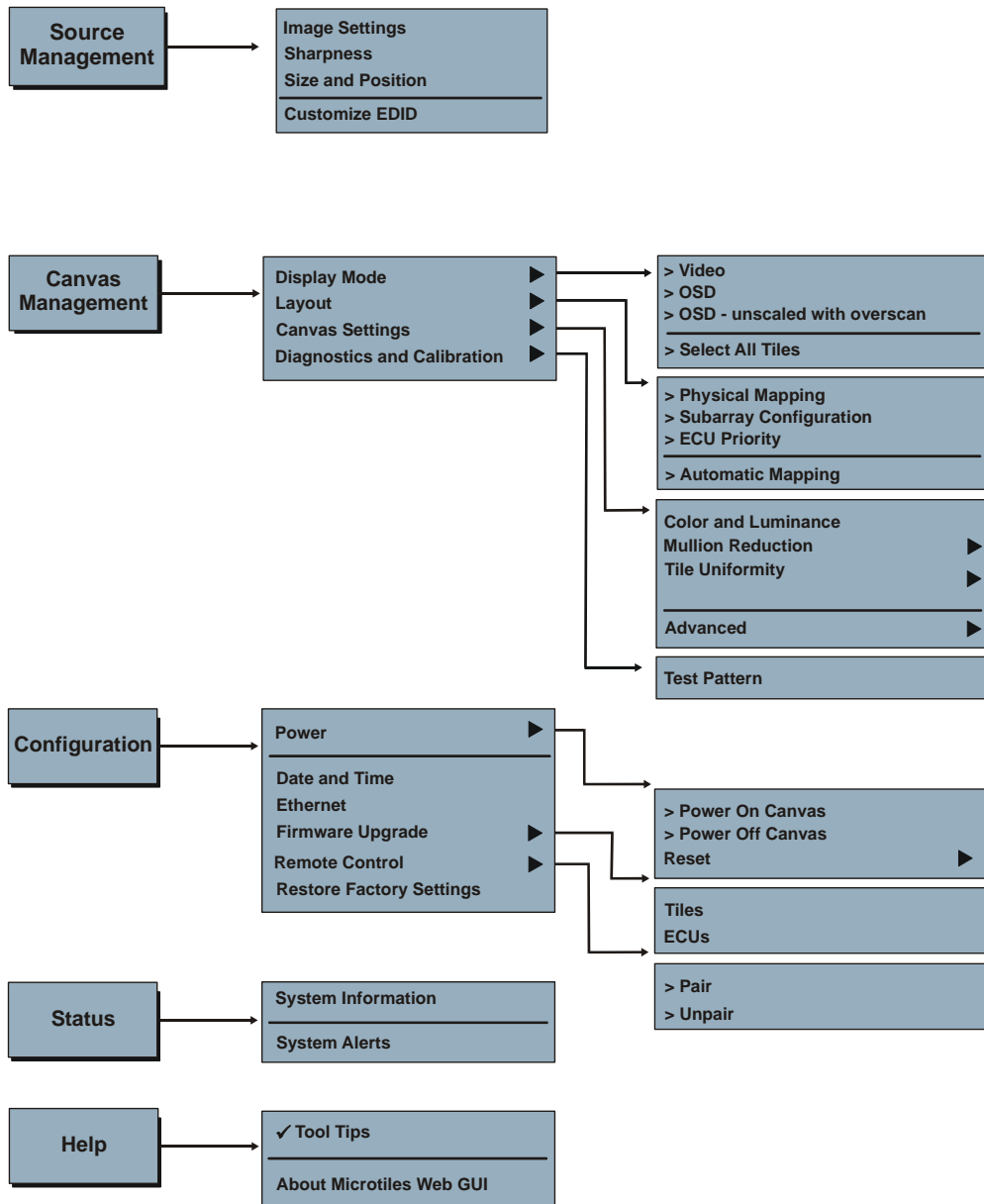


Figure 3-12 Christie MicroTiles WebUI Menu Tree

3.7 Navigating the WebUI

Users are prompted to login upon start-up. Use **admin** for both the user name and password. Each screen available through the WebUI has the same top toolbar from which the following can be done:

- Select and setup an active input source
- Manipulate the appearance of video content (i.e., size, position, color, sharpness)
- Select between video and OSD display modes
- Perform firmware upgrades
- Display a test pattern
- Array mapping
- View system information and alerts
- View current time and date
- Access online help (Not available at this time. Will be available for future software release)

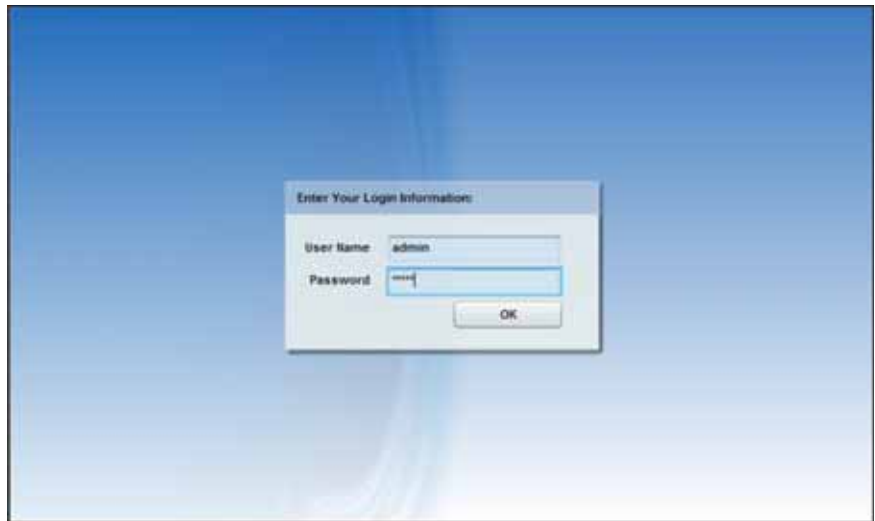


Figure 3-13 WebUI Login Screen

3.8 WebUI Source Management Menu

This menu (**Figure 3-14**) allows users to manually or automatically select and setup an active input source. This includes setting up the size and position of the display window and adjusting image settings. The only video input source compatible with MicroTiles is DVI-D. **NOTE:** *The maximum input resolution supported per ECU is 1920 x 1200 @60Hz.*

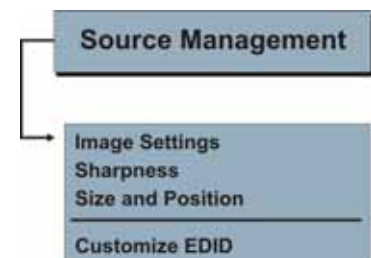


Figure 3-14 WebUI Source Management Menu Tree

3.8.1 Adjust Image Settings

To access the Image Settings screen, click **Source Management** from the top menu bar and select **Image Settings** from the drop-down menu that appears (**Figure 3-15**). This screen enables users to manually adjust the image contrast, brightness and gamma for individual tiles or the entire array.

1. Either click **Select All** to select each ECU connected to the canvas or click on an ECU from the spreadsheet (**Figure 3-15**). If the spreadsheet is not populated click **Read** to load information about all the ECUs connected to the canvas.
2. Clicking a row in the spreadsheet selects a single ECU. **NOTE:** *The master ECU has the highest priority number.*

The **Source** field within the spreadsheet indicates the following:

- a. 0 - No video signal
 - b. 1 - DVI clock detected
 - c. 2 - Input stable
 - d. 3 - DVI clock detected and input stable
3. Click the **Read** button beside the **Brightness**, **Contrast** and **Gamma** settings to query the ECU(s) for the current brightness, contrast and gamma settings of the canvas (**Figure 3-15**).
 4. To manually change the **Brightness**, **Contrast** and **Gamma** settings use either the scroll bar or the up/down arrows to change the value.
 5. Click **Set** to send the changes to the ECU(s) and view the results on the tiles.



ECU #	IP Address	Serial	Priority	Source	Source Width	Source Height	Frame Rate	Global Video Source
0	192.168.228.94	8e9022f265	0	0	0	0	0.00	false
1	192.168.228.96	8e9024e59d	10	2	1920	1080	59.94	true

Figure 3-15 Image Settings

3.8.2 Adjusting Sharpness

To access the Sharpness screen, click **Source Management** from the top menu bar and select **Sharpness** from the drop-down menu that appears (**Figure 3-15**). This screen enables users to manually adjust the image sharpness for individual tiles or the entire array.

1. Either click **Select All** to select each tile in the array or click on an individual tile from the **Tile Schematic** section. Tile Schematic displays the physical layout or map of all the tiles (**Figure 3-16**). Clicking and dragging the background pans the view. Clicking on an individual tile selects that tile. Click the +/- keys to zoom in and out. Click **Reset** to return to the original view. Click **Refresh** to re-sync the view to the latest information from the server.
2. Click the **Read** button beside the **Sharpness** section to query the ECU(s) for the current sharpness settings of the array (**Figure 3-16**). Sharpness settings can be **Set** to the entire array, but not **Read**. If you attempt to **Read** the entire array the warning message, Please select a tile; this command cannot be broadcast to all tiles is generated. Sharpness settings can be **Set/Read** to individual tiles.



Figure 3-16 Adjusting Sharpness

3. To check the status of a particular tile, place your mouse over the desired tile under the **Tile Schematic** section to display its properties (**Figure 3-17**).

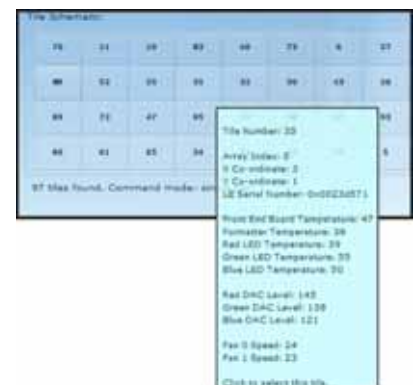


Figure 3-17 Tile Properties

3.8.3 Change Size and Position of Video Content

To access the Size and Position screen (Figure 3-18) click **Source Management** from the top menu bar and select **Size and Position**. This screen enables users to manually adjust the X/Y offsets, and the width and height of the display to accommodate the particular application. Automatic mapping must be enabled in order for this function to work. For details, refer to [Automatic Mapping, on page 3-29](#).

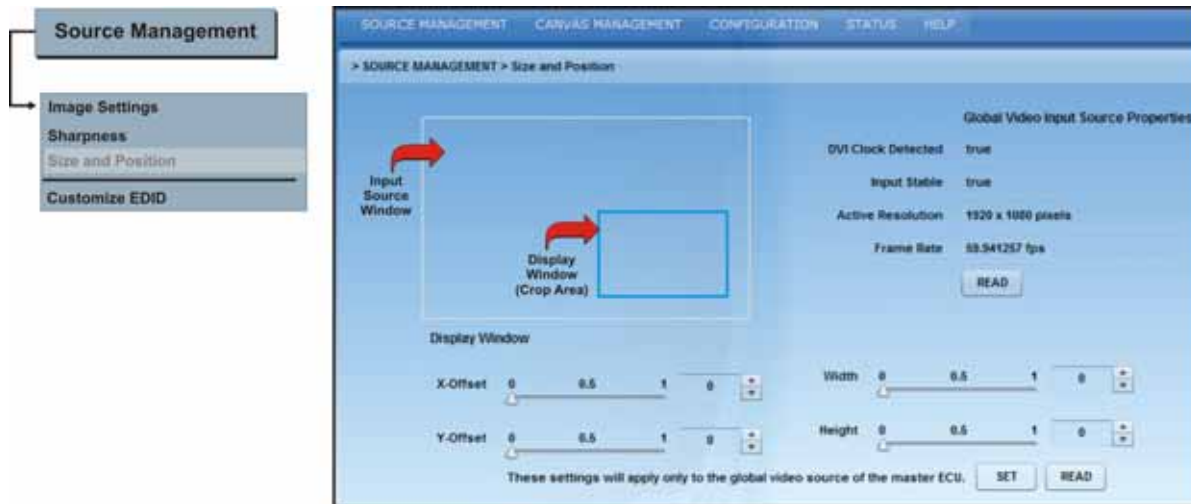


Figure 3-18 Size and Position

Global Video Input Source Properties

Click **Read** to scan the properties of the input source detected by the ECU. The input source properties include;

- **DVI Clock Detected** must state **True** in order to view video content on the tiles. When this input reads **False** check the connection between the ECU(s) and the video source, and try again.
- **Input Stable** indicates the stability of the input source. If this field states **False** ensure the video source is operating and ensure the video file is not corrupt.
- **Active Resolution** displays the width and height of the array in pixels.
- **Frame Rate** displays the frames per second.

Display Window

NOTICE: *These settings are only applied to the global video source of the master ECU.*

Adjusting the display window settings changes the capture size of the active input window. The **X-Offset**, **Y-Offset**, **Width** and **Height** values are expressed as a percentage of the active input where, the top left of the array represents 0,0. The sum of **X-Offset** and **Width** must be greater than or equal to 0 and less than the width of the active input source. The sum of **Y-Offset** and **Height** must be greater than or equal to 0 and less than the height of the active input source. Once the changes you require have been made, click **Set** to apply the current configuration to the array. Click **Read** to display the current settings of the display window.

3.8.4 Customize Extended Display Identification Data (EDID)

To access the editor from the WebUI click **Source Management** from the top menu bar and select **Customize EDID** (Figure 3-19). Customize EDID allows you to create a custom video resolution to send to the graphics card. The default settings are 1920 horizontal pixels x 1200 vertical lines at a vertical frame rate of 59.94 hertz. If you want to restore the default values, use the **Restore Default EDID values** and click **Set**. This feature can be used for one or more ECUs. You can select one and adjust the settings or click **Select All** to change the settings for more than one ECU.

1. Click the **Set** button beside the **Update Using ASCII File** field if using an ASCII file provided by Christie.
2. Click the **Set** button beside the **Restore Default EDID Values** if the ECU cannot detect or display a good video source. This can occur when connecting different types of input sources to the ECU, which can cause the EDID information to be incorrect.

The EDID editor consists of 3 customizable elements:

- **Horizontal Size:** Use the scroll bar or the up/down arrows to adjust the horizontal size of the display. The minimum value is 720 and the maximum value is 4088. The default is 1920. Increments in a step size of .001.
- **Vertical Size:** Use the scroll bar or the up/down arrows to adjust the vertical size of the display. The minimum value is 540 and the maximum value is 4095. The default is 1200. Increments in a step size of .001.
- **Frame Rate:** Use the scroll bar or the up/down arrows to adjust the frame rate of the display. The minimum value is 1 and maximum value is 75. The default is 59.94. Increments in a step size of 0.01.

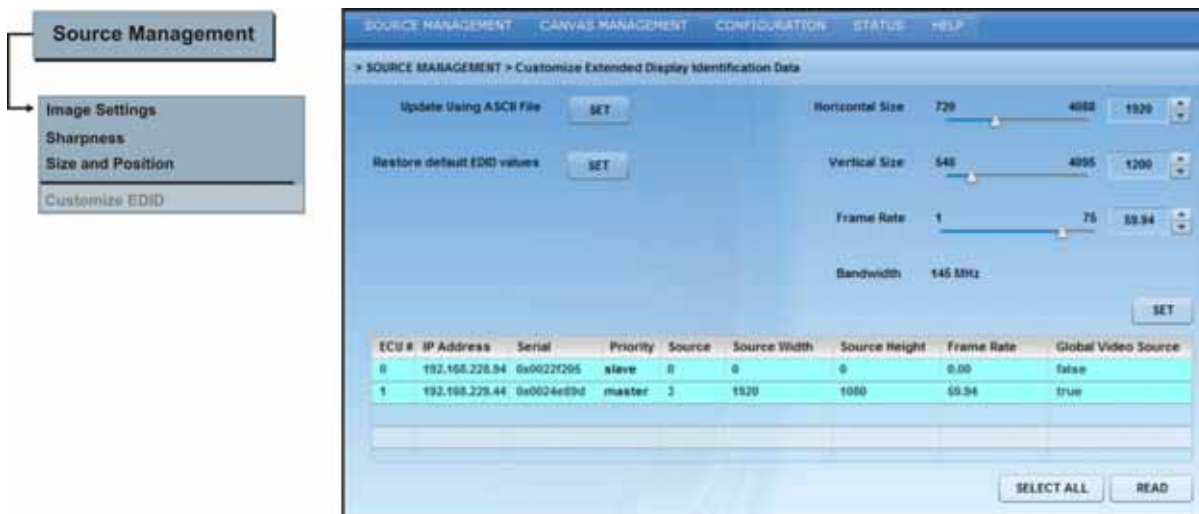


Figure 3-19 Customize EDID

3.9 WebUI Canvas Management Menu

Through this menu (**Figure 3-20**), the tiles can be automatically or manually mapped, the subarray can be configured, array settings can be adjusted and a test pattern can be displayed. Users can also switch the display mode between **Video**, **OSD** and **OSD (Unscaled with Overscan)**. Typically, for most applications **Video** is used.

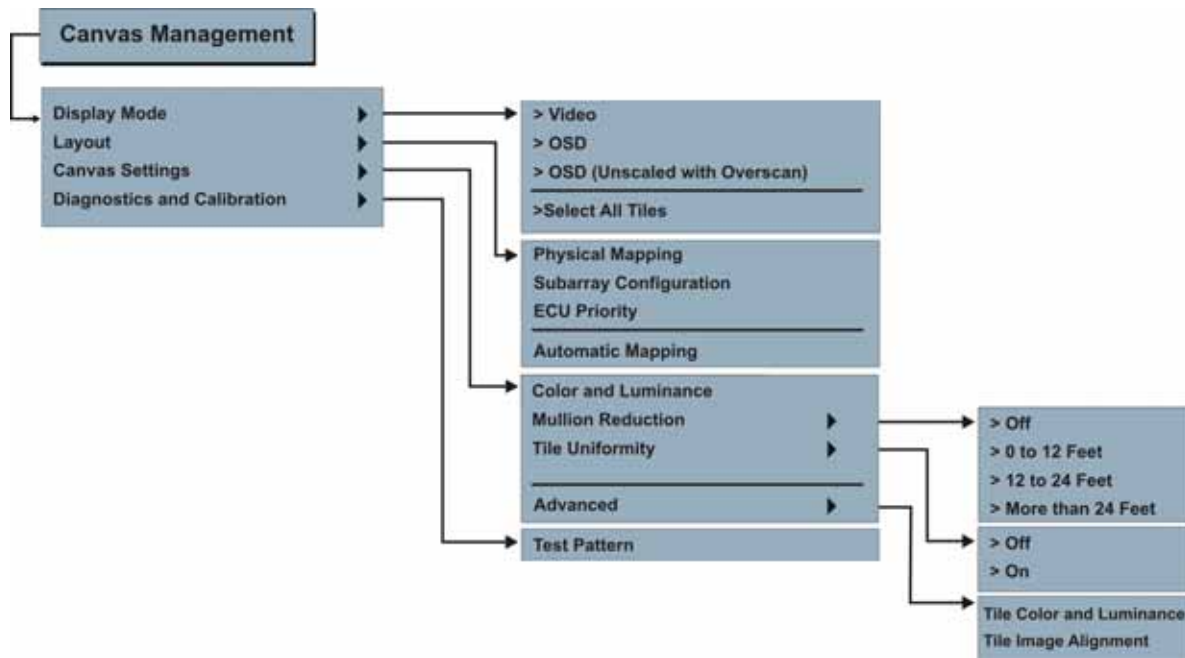


Figure 3-20 WebUI Canvas Management Menu Tree

3.9.1 Select a Display Mode

From the top menu bar of the WebUI click on the **Canvas Management** menu and select **Display Mode** from the drop-down menu (Figure 3-21). From the cascading menu that appears, select between **Video**, **OSD** and **OSD - unscaled with overscan** to display the content on the tiles. If a display mode is activated when only one tile is selected, the signal is sent only to the active tile and the warning **Not all tiles are selected** appears on-screen. To select the entire array, click **>Select All Tiles** from the **Canvas Management** drop-down menu.

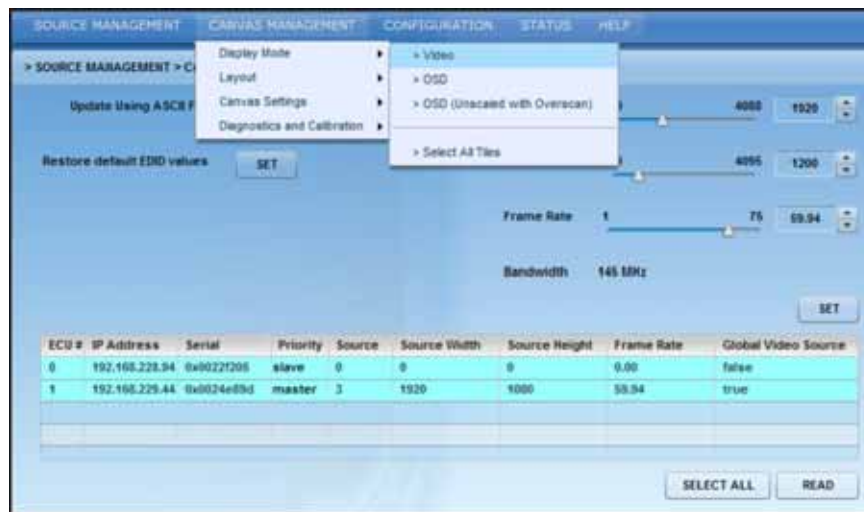


Figure 3-21 Display Mode

Display Mode Options

- **Video:** Select to display video from the ECU input source (HSSL-1 or HSSL-2). One or both ports must be enabled. For details, refer to [2.7 Connecting Sources, on page 2-16](#).
- **OSD:** Select to display a 800 x 600 image, scaled to approximately 720 x 540, which is the viewable area of the screen.
- **OSD - unscaled with overscan:** Typically, overscan resolution (800 x 600) is used to display test patterns.

3.9.2 Layout

Physical Mapping

NOTICE: When *Automatic Mapping* is disabled, any changes made using *Physical Mapping*, *Subarray Configuration* or *Display Mode* will not take effect.

Physical mapping is a useful tool when configuring a canvas that includes groups of tiles not physically connected.

1. Ensure **Automatic Mapping** is enabled. For information, refer to [Automatic Mapping, on page 3-29](#).
2. From the **Canvas Management** drop-down menu select **Layout> Physical Mapping** (Figure 3-22).



Figure 3-22 Canvas Management>Layout>Physical Mapping

3. Click **Read** from the **Manually Mapped Tiles** section to load all previously saved information from the master ECU. This spreadsheet displays all the manually mapped tiles. To select a specific manually mapped tile click on it from this spreadsheet. Once selected the manually mapped tile in the spreadsheet is selected, as well as the corresponding tile in the All Tiles section, and the selected tile is centered in the main grid (**Figure 3-23**).
4. Drag and drop a tile from the bottom left to the main grid to manually map it. Use the rows (y-coordinates) and columns (x-coordinates) of the grid to manually map tiles; the input image automatically stretches spanning across all manually mapped tiles. The top left is 0,0. Each array index corresponds to a unique mapping of the input image.

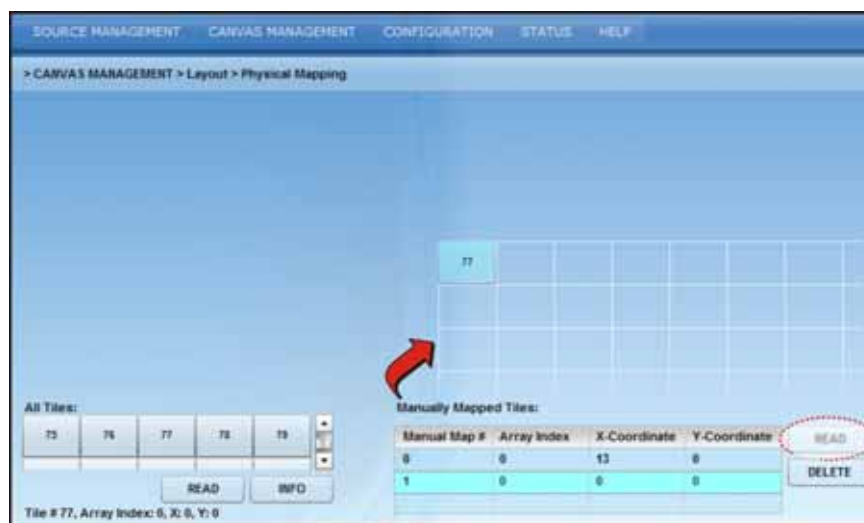


Figure 3-23 Manually Mapped Tiles

5. Click **Read** underneath the **All Tiles** section of the screen. This section is then populated with all the source tiles. Click and drag the tiles from this section to the main grid in order to manually map them. The image on the array is automatically configured and mapped once the tile is dropped into the main grid. Transparent tiles indicate tiles that have been manually mapped and opaque tiles indicate tiles that have not.
6. Re-read the **Manual Mapped Tiles** spreadsheet to synchronize the views.
7. Click the **Info** button to bring up the properties of each MicroTile. This is similar to the **Info** button function on the R100 Remote Control. For details, refer to [3.4 R100 Remote Control, on page 3-3](#). **NOTE:** Use the *Tile Properties* screen to see the number of each tile. For details, refer to *Tile Properties, on page 3-45*.

Subarray Configuration

Subarray Configuration enables users to display two images on an array or to increase the input resolution. In order for this to function multiple ECUs must be connected to the array and automatic mapping must be enabled. For information on how to connect multiple ECUS, refer to [2.2.8 Cable Routing, on page 2-10](#). To access the Subarray Configuration screen click on the Canvas Management menu and select **Layout>Subarray Configuration (Figure 3-24)**. **NOTE:** *Subarray configuration is not available via the OSD.*

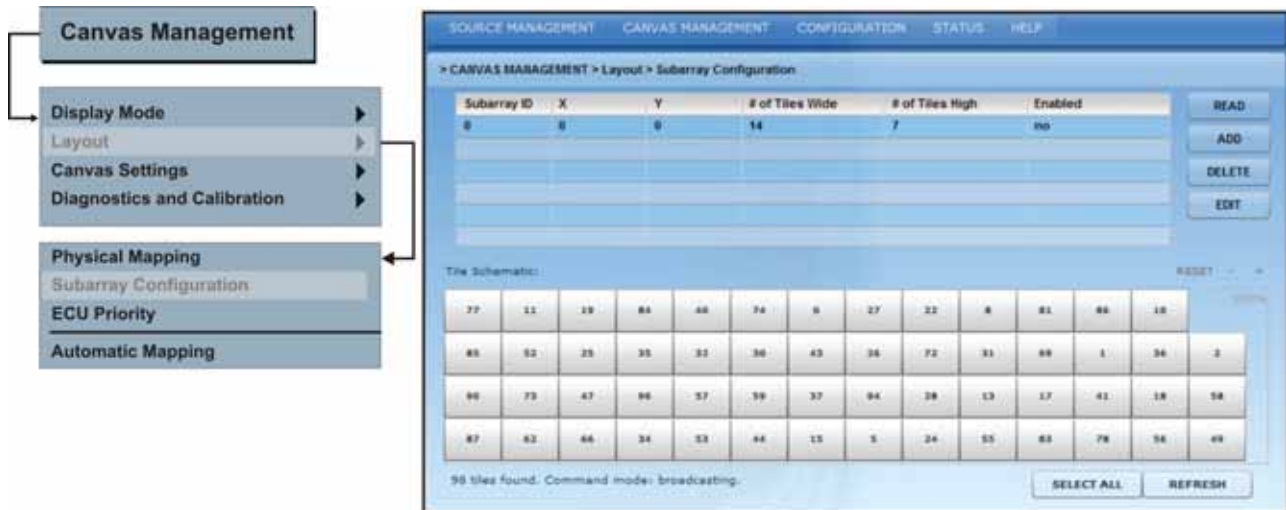


Figure 3-24 Subarray Configuration

Adding a Subarray

NOTE: *Automatic mapping must be enabled for changes to take affect. For details, see [Automatic Mapping, on page 3-29](#).*

1. Click **Read** to get a reading of any subarray regions that have already been created. This information is then populated in the subarray spreadsheet.
2. To create a new subarray region either click **Select All** to select each tile in the array or click on individual tiles from the **Tile Schematic** section to select the 4 corners of the region to add. Press **Shift** to select additional tiles.
3. Click **Add** once the subarray region has been selected.
4. If the subarray spreadsheet did not automatically update, click **Read** to refresh the list.
5. Click **Refresh** to re-sync the **Tile Schematic** to the latest information from the server.

Editing a Subarray

1. All the subarrays saved to the master ECU are shown in the spreadsheet (**Figure 3-24**). To populate the spreadsheet click **Read**.
2. To edit an existing subarray select it from the spreadsheet and click **Edit**. Once selected the bottom portion of the window changes to display the editing properties (**Figure 3-35**). **NOTE:** *Automatic mapping must be enabled for changes to take affect. For details, see [Automatic Mapping, on page 3-29](#).*
3. Use the scroll bars to adjust the **X/Y Offsets** and to change the width and height of the subarray. The display window will change as you make the adjustments. Click **Set** once you are satisfied with the changes.
4. From the **Enabled** drop-down menu you can chose to enable or disable the subarray. Click **Set** to apply the changes.
5. The **Video Source** for the subarray can be defined from the **Video Source** drop-down menu (**Figure 3-25**). Select from **No Video**, **Global** and **Local**. The default setting is **Local**.



Figure 3-25 Edit a Subarray Configuration

ECU Priority

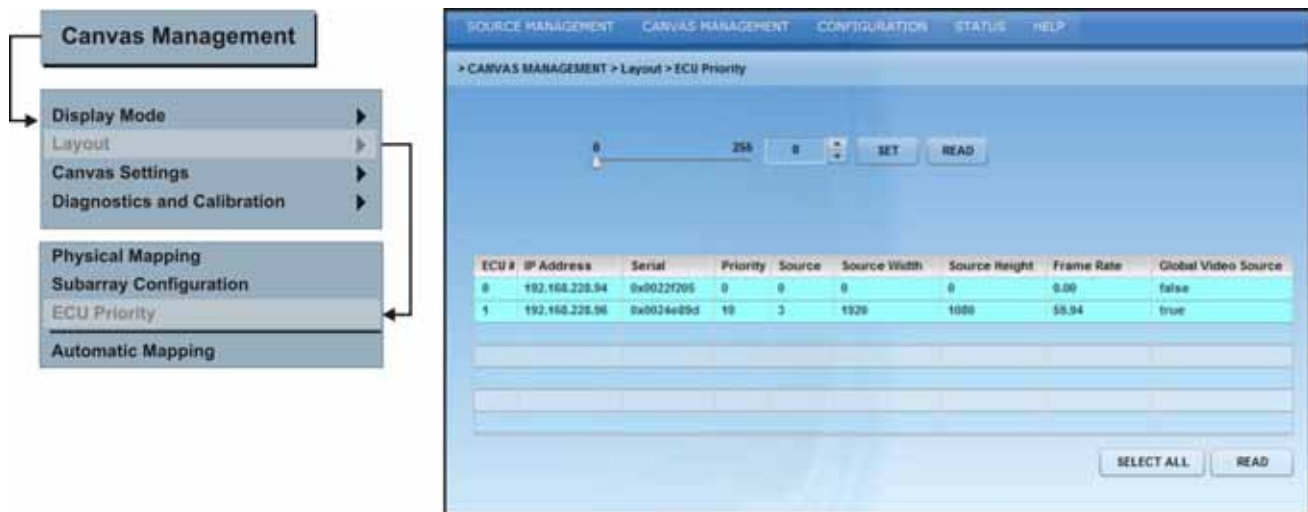
This screen allows users to assign the correct priority to the ECUs, meaning assigning them as a slave or a master. It is a useful tool to set the master ECU when using a multiple ECU configuration. All ECUs are shipped as slaves from the factory. When switching out ECUs in the field it is important to ensure that at least one of them is a master. If you have 2 masters you must set one of them back to a slave.

To assign a specific priority to an ECU:

1. Click **Read** from the bottom of the screen to load the information from the ECUs connected to the canvas.
2. Clicking a row in the spreadsheet selects a single ECU. **NOTE:** *The master ECU has the highest priority number.*

The **Source** field within the spreadsheet indicates the following:

- a. 0 - No video signal
 - b. 1 - DVI clock detected
 - c. 2 - Input stable
 - d. 3 - DVI clock detected and input stable
3. Once an ECU is selected from the spreadsheet select either **Master** or **Slave** from the ECU Priority dropdown menu and click **Set**. **NOTE:** *Click Select All to select all ECUs and set them to 0 and then select one ECU to set as the master (slaves =0, master = 1).*
 4. Click **Read** at anytime to update the array and ensure the most current information is displayed.



ECU #	IP Address	Serial	Priority	Source	Source Width	Source Height	Frame Rate	Global Video Source
0	192.168.228.94	0x022f295	0	0	0	0	0.00	false
1	192.168.228.96	0x034e29d	10	3	1920	1080	58.94	true

Figure 3-26 ECU Priority

Automatic Mapping

MicroTiles are equipped with neighbor detection circuitry. Once power is applied to the array, the ECU uses the neighbor detection circuitry to determine the configuration of the array. It then relays the total dimensions of the array and the exact physical location of the array back to each tile. Mapping is required to organize the display in the array and to ensure each tile knows its physical arrangement within the array. Mapping is checked approximately every 10 seconds. By default, mapping is enabled. Each tile, knowing its own position within the array and the video source characteristics, is required to crop the active input source, select its own sub-image portion and scale the sub-image to display in full screen. **NOTE:** *When Automatic Mapping is disabled, any changes made using Physical Mapping, Display Mode and Subarray Configuration will not take effect.*

1. From the **Canvas Management** drop-down menu select **Layout** and **Automatic Mapping (Figure 3-27)**.
2. Once the screen shown in **Figure 3-27** appears, select **Enabled** from the **Automatic Mapping** drop-down menu and click **Set**. Each tile within the array crops the active input source, selects its own sub-image portion and scales the sub-image to display on the full screen (array).
3. Click **Read** at anytime to update the array and ensure the most current information is displayed.

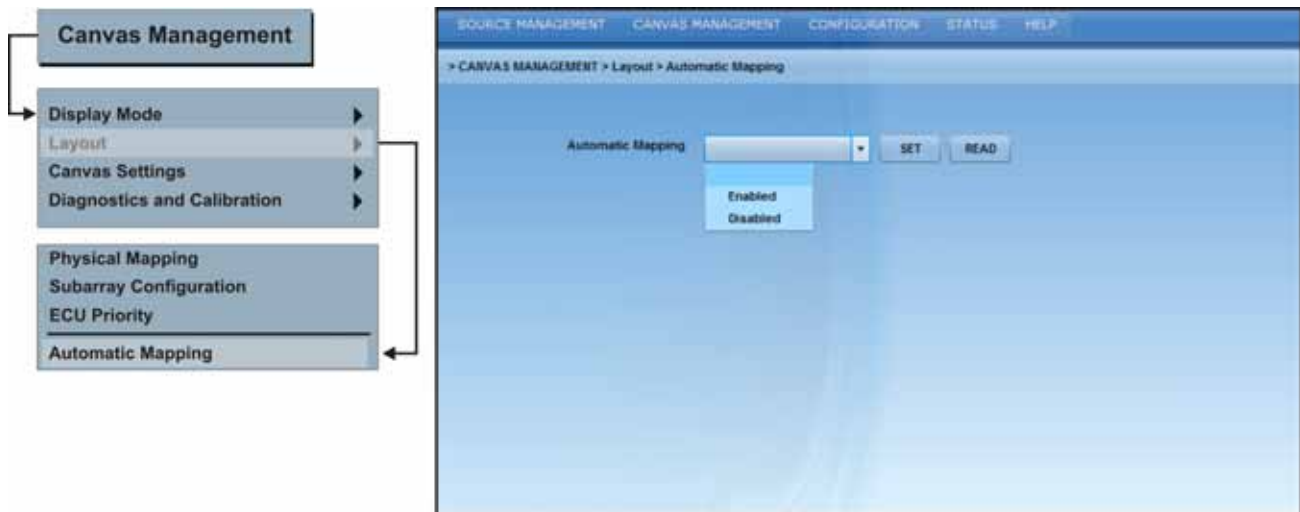


Figure 3-27 Automatic Mapping

3.9.3 Canvas Settings

Color and Luminance

The ECU periodically polls all attached tiles to determine the optimal colorimetry and brightness setting for the array as a whole. This optimal operating point is transmitted to all attached tiles. It is the responsibility of the individual tiles to ensure they actually meet the requested colorimetry. The **Color and Luminance** screen allows users to manually adjust the nits of the entire array and to enable or disable color matching of the array. To access this screen select **Canvas Management** from the top menu bar and then select **Canvas Settings** > **Color and Luminance** from the drop-down menu (**Figure 3-28**).

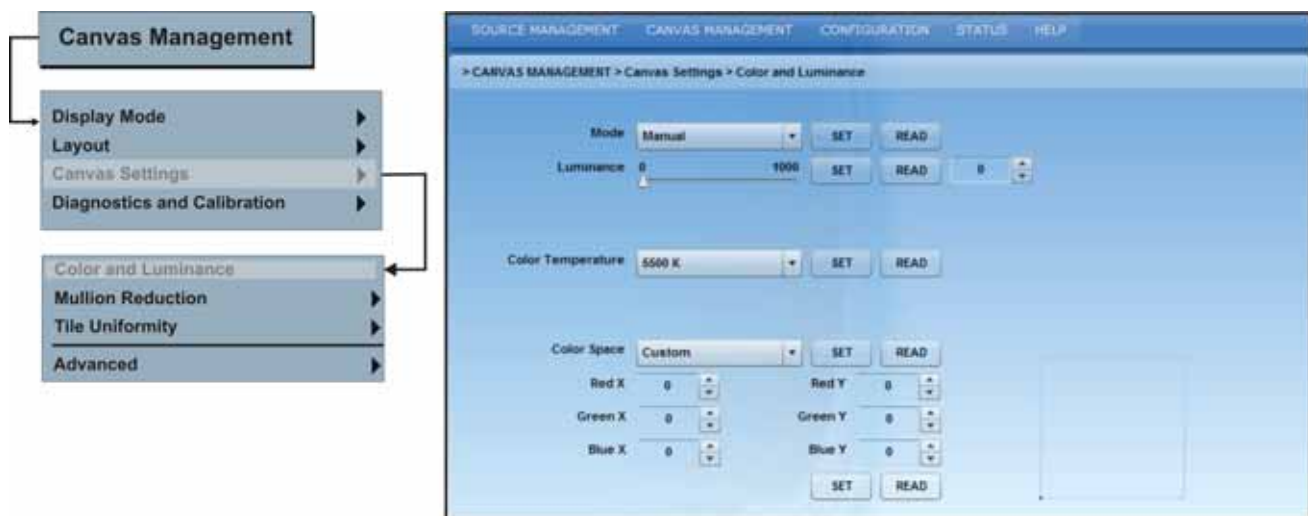


Figure 3-28 Color and Luminance Settings

Color Correction Mode

In order to change luminance, color temperature and color space the **Mode** field must be set to **Manual**. When this field is set to **Off** any changes made to luminance, color temperature and color space will not take affect. Click **Read** at any time to view the current settings.

Luminance Levels

Use the scroll bar or the up/down arrows to manually set the luminance level, in nits, for the array. This setting can only be adjusted when **Mode** is set to **Manual**.

Color Temperature

This selection allows users to manually adjust the color temperature of the MicroTiles array. Color temperature dictates how warm or cool the video output on the array appears. The higher the color temperature the cooler and bluer the image. The lower the color temperature the warmer and redder the image. Click **Set** to apply any changes. Click **Read** to query what the current setting is or to refresh the array. Color temperature settings range from 5500-8500K. **NOTE:** A mode of color correction must be selected from the **Mode** drop-down in order to adjust color temperature.

Color Space

This enables the selection of the type of color decoding. **NOTE:** *The setting defaults to maximum.*

- **sRGB:** Select this option to apply standard RGB color space to the array.
- **Custom:** Select this option to manually adjust the XY coordinates of the RGB color spectrum.

3.9.4 Mullion Reduction

Use mullion reduction to adjust the brightness level to the edges of the tiles until they appear smaller. It is recommended to have video playing on the array when adjusting mullion to see the changes take effect. To access mullion reduction select **Canvas Management** from the top menu bar and then **Mullion Reduction** from the cascading menu (**Figure 3-29**). Select between **OFF**, **0 to 12 Feet**, **12 to 24 Feet** and **More than 24 Feet**. When a selection is made you will see the effect on the video content showing on the array. **NOTE:** *Feet refers to the recommended viewing distance.*



Figure 3-29 Mullion Reduction Menu

3.9.5 Tile Uniformity

Uniformity correction is enabled by default and ensures the light source in the center of the tile (known as the hot spot) is dimmed to ensure brightness is uniform. To access uniformity correction select **Canvas Management** from the top menu bar and then **Canvas Settings > Tile Uniformity** from the drop-down menu (**Figure 3-30**).



Figure 3-30 Tile Uniformity Menu

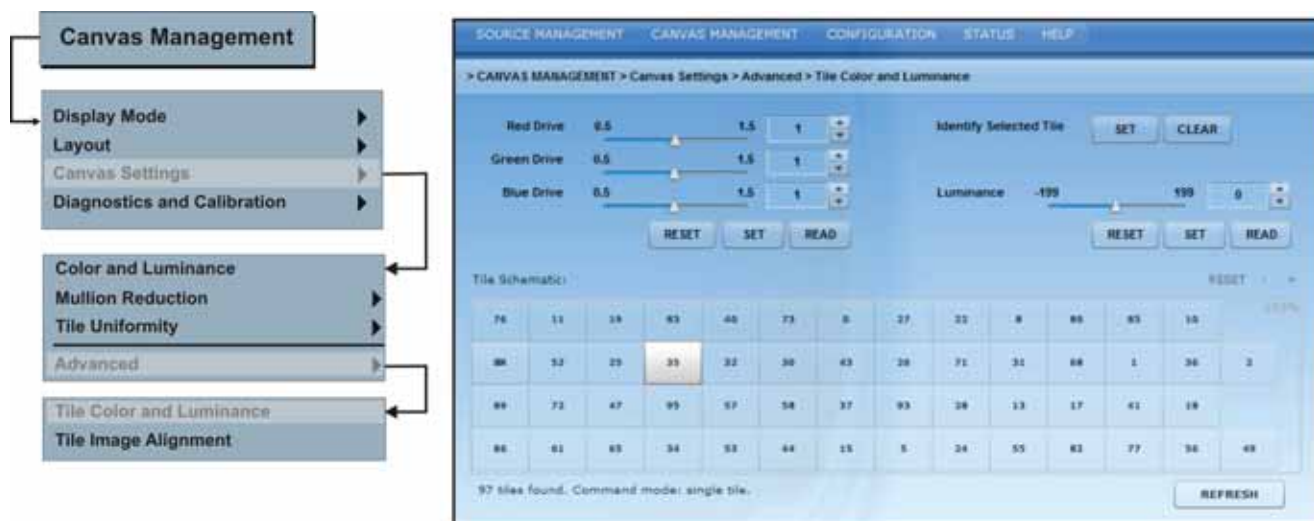
3.9.6 Advanced Canvas Settings

Tile Color and Luminance

NOTICE: *MicroTiles are designed for automatic image alignment and color matching. Overriding individual settings is not recommended and should only be performed following proper training.*

This screen enables advanced users to manually adjust color uniformity.

1. Ensure all tiles are selected and click **Clear** beside the **Identify Selected Tiles** field. This will turn the display white.
2. Ensure the tiles are in OSD mode. Refer to, [3.9.1 Select a Display Mode, on page 3-23](#).
3. Select one tile from the **Tile Schematic** and click **Set** beside the **Identify Selected Tiles** field. You will see a small black dot appear on the selected tile.
4. Adjust the RGB and luminance settings are needed, using the scroll bars or up/down arrows. Click **Reset** to return the user interface values to the default settings. Click **Set** to see the changes take affect and **Read** to confirm the changes.



The screenshot shows the 'Advanced Tile Color and Luminance' settings page. It includes a navigation menu on the left with 'Canvas Management' expanded to show 'Advanced' selected. The main interface features three drive sliders (Red, Green, Blue) and a Luminance slider, each with 'RESET', 'SET', and 'READ' buttons. Below is a 'Tile Schematic' grid where one tile is highlighted. The status bar at the bottom indicates '97 tiles found. Command mode: single tile.' and a 'REFRESH' button.

Figure 3-31 Advanced Tile Color and Luminance Settings

Tile Image Alignment

This screen enables advanced users to manually correct image alignment.

1. Ensure all tiles are selected and select the **Grid** test pattern from the **Canvas Management>Diagnostics and Calibration> Test Pattern** screen. For details, refer to [3.9.7 Display a Test Pattern, on page 3-34](#).
2. Once the grid test pattern is displayed select one tile in the **Tile Schematic** section from the **Test Pattern** screen.
3. Change the color of the grid lines for this tile.
4. Access the Tile Image Alignment screen (**Figure 3-32**) to adjust the XY offsets of the top, bottom, left and right values. Click **Read** to see the changes take affect and **Set** to confirm the changes.

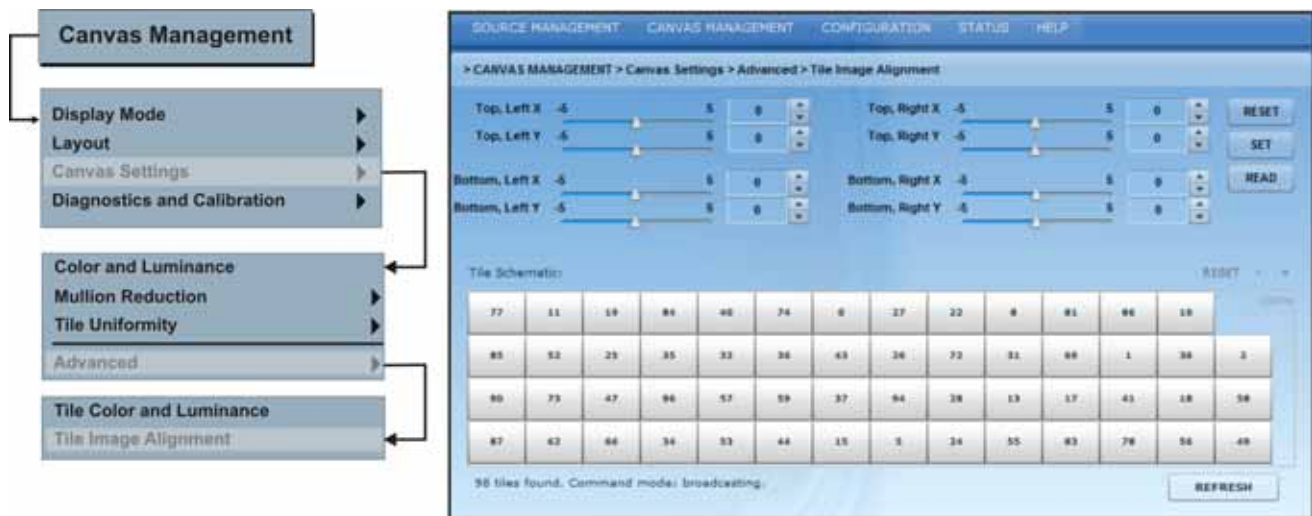


Figure 3-32 Advanced Tile Image Alignment

3.9.7 Display a Test Pattern

This screen (**Figure 3-33**) allows users to select from a list of test patterns used for troubleshooting and setup purposes. Certain test patterns are ideal for certain procedures. For instance, the **13 Point Optical** test pattern is ideal for setting up focus.

1. From the **Canvas Management** drop-down menu, select **Diagnostics and Calibration > Test Pattern** to access the screen shown in **Figure 3-33**.
2. Click on a particular tile in the **Tile Schematic** section to apply the change to a specific tile only or click **Select All**.
3. From the **Display Mode** drop-down menu, select **Video**, **OSD** or **OSD - unscaled with overscan**. In order to display internal test patterns, **Display Mode** must be set to **OSD** or **OSD - unscaled with overscan**.
NOTE: *OSD is the preferred mode if checking mechanical alignment (or electronic geometry alignment).*
4. From the **Test Pattern** drop-down menu, select which type of test pattern to display. Choices include: **Solid Color**, **Color Bars**, **Grayscale**, **Checkerboard**, **Checkerboard Inverted**, **Grid**, **13 Point Optical**.
NOTE: *When using the Solid Color test pattern select a specific color to use from the Color fly-out menu.*
5. If necessary, adjust the width and height of the test pattern by clicking on the up/down arrow keys or by entering a value in the designated fields. **NOTE:** *Width and Height values are only valid for the Checkerboard, Checkerboard Inverted and Grid test patterns.*
6. To return to displaying video content, make sure **Video** is selected from the **Display Mode** drop-down menu.



Figure 3-33 Diagnostics and Calibration>Test Pattern

3.10 Configuration Menu

This menu (**Figure 3-34**) allows users to enable/disable power to the canvas, reset the tiles and ECU, upgrade the firmware, and update the date and time.

3.10.1 Power ON/OFF All Tiles

Selecting **Power ON Canvas** and **Power OFF Canvas** affects the entire array, regardless of how many tiles have been selected through the firmware application. **NOTE:** *Wait approximately 10 seconds between powering the canvas OFF and ON.*

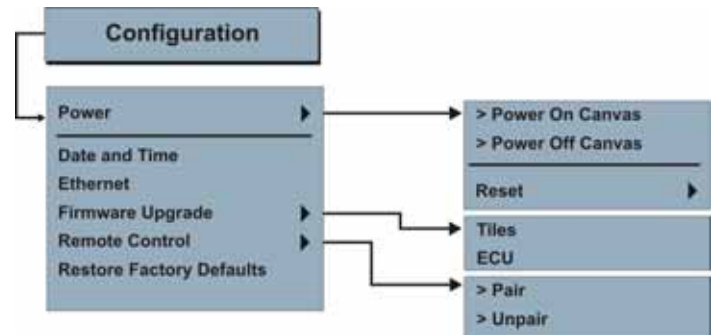


Figure 3-34 WebUI Configuration Menu Tree

3.10.2 Resetting Selected Tile(s) and ECU(s)

The tiles and ECU(s) must be reset after a firmware upgrade in order for the changes to take effect. This function affects the tiles that have been selected through the WebUI. For more information, refer to [3.10.4 Upgrading Main Firmware, on page 3-36](#).

3.10.3 Set Date and Time

This screen allows users to set the current system date and time. The date displayed in the **MicroTiles System Date and Time** field is processed from the ECU, while the date in the **New Time** field is updated to the time on the computer. Click **Read** to see changes take effect and click **Set** to store the changes. To access this screen select **Configuration** from the top menu bar and **Date and Time** from the drop-down menu that appears.

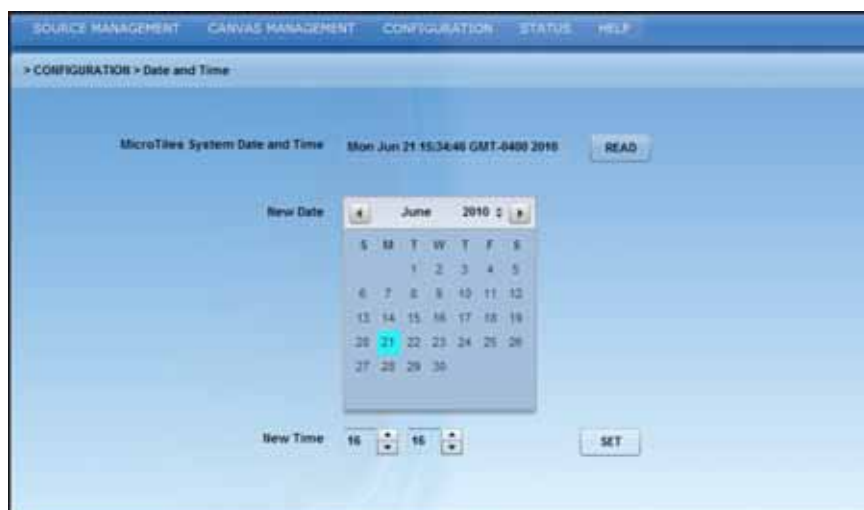


Figure 3-35 Configuration > Date and Time

3.10.4 Upgrading Main Firmware

NOTICES: **1)** Before updating the firmware check online at www.microtiles.com to ensure the latest firmware version is installed. Failure to install the latest version can affect system performance. **2)** When working with a multiple ECU configuration each ECU must be updated with firmware version 1.0.1.7 or higher in order for the master/slave functionality to work. **3)** Ensure the ECU and MicroTile(s) firmware versions match. **4)** During a firmware upgrade, the web server will be unresponsive for several minutes and video may be interrupted or temporarily disabled. **5)** During a firmware upgrade DO NOT attempt to use the OSD, the WebUI or open another web browser.

Check Current Firmware Version from OSD

1. Press **Menu** on the R100 Remote Control to access the OSD.
2. Select **Status** from the OSD Main Menu.
3. From the **Status** menu select from either External Control Unit or Tiles to view the current firmware versions installed on each. Ensure the firmware versions match. For details, refer to [3.5.7 OSD Status Menu, on page 3-14](#).
4. Go to www.microtiles.com to check for the latest available firmware version. If the version found on the web does not match the version on the product ensure the web browser cache is cleared.

Check Current Firmware Version from WebUI

1. Select **Status** from the top menu bar and then **System Information** from the drop-down menu.
2. From the System Information screen, select either **External Control Unit (Figure 3-36)** or **Tiles (Figure 3-27)** to view the current firmware version installed on the selected hardware. If necessary, click **Read All** to populate the screen information. You must have 1 ECU or one tile selected in order to get a reading.

Check WebUI ECU Firmware Version



The screenshot shows the WebUI interface for checking ECU firmware versions. The breadcrumb trail is: STATUS > System Information > External Control Unit. The page title is "External Control Unit". There are two tabs: "Web Application" and "External Control Unit". The "External Control Unit" tab is active. The page displays the following information:

- FPGA Version: 1.00.04071
- Driver Version: 1.00.2.04409
- CMECU Version: 1.00.7.04491

A bracket groups these three items under the heading "Firmware Information". Below this information is a "READ ALL" button and a note: "This setting only applies to the master ECU: ECU LOG".

Below the firmware information is a table with the following columns: ECU #, IP Address, Serial, Priority, Source, Source Width, Source Height, Frame Rate, and Global Video Source. The table contains two rows of data:

ECU #	IP Address	Serial	Priority	Source	Source Width	Source Height	Frame Rate	Global Video Source
0	192.168.225.94	0x00227205	slave	0	0	0	0.00	false
1	192.168.225.44	0x0024e8bd	master	3	1920	1080	59.94	true

At the bottom right of the table area is a "READ" button.

Figure 3-36 ECU Firmware Version

Check WebUI Tiles Firmware Version

To access the firmware screen for the tiles select **Tiles** and then **Firmware Versions** from the screen.

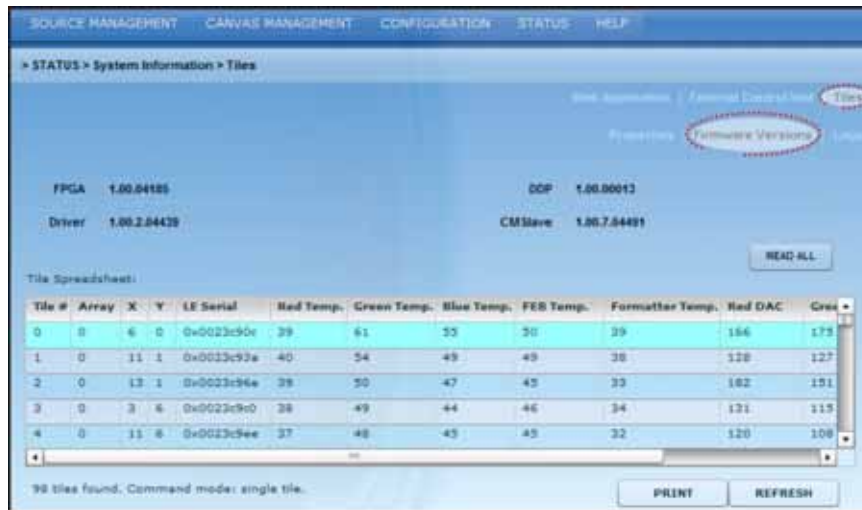


Figure 3-37 Tile Firmware Version

- Go to www.microtiles.com to check for the latest available firmware version, under **Overview>Support Documents**. If the version found on the web does not match the version on the product ensure the web version is downloaded. **NOTE:** *This link is password protected.*

Upgrade Firmware

If the following error message appears Warning, duplicate tile addresses exist, do not attempt a firmware upgrade (**Figure 3-38**). Reset the array before attempting a firmware upgrade.



Figure 3-38 Duplicate IP Address Warning

1. From the WebUI, select **Configuration** from the top menu bar and **Firmware Upgrade** from the drop-down menu that appears. Select either **Tiles** or **ECUs** from the cascading menu. **NOTE:** *Users can chose to upgrade the firmware or hardware for a group of selected tiles or an ECU. For information on hardware upgrades, refer to [3.10.5 Hardware Upgrades](#), on page 3-40.*

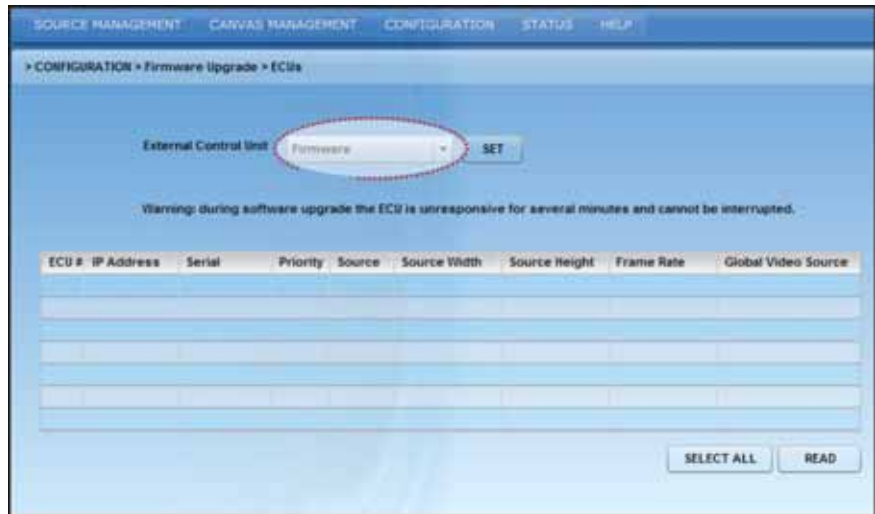


Figure 3-39 Firmware Upgrade-ECU

2. **ECU Firmware Upgrade:**
 - a. Begin with the Firmware upgrade and then the FPGA upgrade (**Figure 3-39**). Select the desired ECU from the spreadsheet. Select **Firmware** from the **External Control Unit** drop-down menu (**Figure 3-39**) and click **Set**. This upgrade takes approximately 1 hour for every 10 connected ECUs.
 - b. Once the upgrade has been completed, reset the ECU(s) to make sure the new upgrades are active. Upon completion of an ECU firmware upgrade, the web browser may not recognize the new WebUI application from the ECU. To correct this clear the web browser cache.

3. Tiles Firmware Upgrade:

- a. Select the desired tile(s) from the **Tile Schematic** section either by clicking **Select All** or individually selecting tiles in the schematic (press the **Shift** key to select multiple tiles). Select **Firmware** from the **Selected Tile(s)** drop-down menu (**Figure 3-40**) and click **Set**. Begin with the firmware upgrade and then perform the FPGA upgrade. **NOTE:** *Users can chose to upgrade the firmware or hardware for a group of selected tiles or an ECU from the Firmware Upgrade screen. For information on hardware upgrades, refer to [3.10.5 Hardware Upgrades, on page 3-40](#).*
- b. Once the upgrade has been completed, reset the tiles to make sure the new upgrades are active.

4. Light Engine Upgrade:

NOTICE: *DO NOT initiate a light engine upgrade unless an upgrade is posted at www.microtiles.com. Light engine upgrades take approximately 35 minutes for 100 connected tiles.*

- a. Select **Light Engine** from the **Selected Tile(s)** drop-down menu to upgrade the firmware for the light engine in all of the selected tiles (**Figure 3-40**). Reset all tiles to complete the upgrade and make sure the light engine firmware is active.

NOTE: *Firmware upgrades take approximately 35 minutes to complete. If you are using Windows®, Adobe® Flash Player™ Plug-In version 9.0, must be installed in order to initiate the upgrades. Adobe® Flash Player Plug-In™ version 10.0 or higher is required if you are using Mac® or Linux®.*



Figure 3-40 Firmware Upgrade-Tiles

3.10.5 Hardware Upgrades

Upgrading the Field Programmable Gate Array (FPGA)

NOTE: *It is recommended that the FPGA hardware upgrade be performed at the same time as a firmware upgrade.*

1. From the WebUI, select **Configuration** from the top menu bar and **Firmware Upgrade** from the drop-down menu (**Figure 3-39**).
2. **ECU FPGA Upgrade:**
 - a. Select **ECU** from the **Firmware Upgrade** cascading menu. Select **FPGA** from the **External Control Unit** drop-down menu.
 - b. A Microsoft Explorer window appears. Search for the upgrade file and click **Open** to initiate the upgrade.
 - c. **FPGA** hardware upgrades take approximately 3 minutes to complete for a single tile or 35 minutes for 100 connected tiles. Adobe® Flash Player™ Plug-In version 9.0, must be installed in order to initiate upgrades if you are using Windows®. Adobe® Flash Player Plug-In™ version 10.0 or higher is required if using Mac® or Linux®.
 - d. To complete the upgrade reset the ECU.
3. **Tiles FPGA Upgrade:**
 - a. Select **Tiles** from the **Firmware Upgrade** cascading menu. Select **FPGA** from the **Selected Tiles(s)** drop-down menu.

3.10.6 Remote Control

Remote Pairing via the WebUI

This is done when you are unable to physically access the ECU. **NOTES: 1)** Only one remote can be paired to the master ECU. **2)** Pairing does not function with slave ECUs.

1. Select **Configuration** from the top menu bar of the WebUI.
2. Click **Remote Control** and then **Pair** from the cascading menu. The screen shown in **Figure 3-41** appears on the OSD.

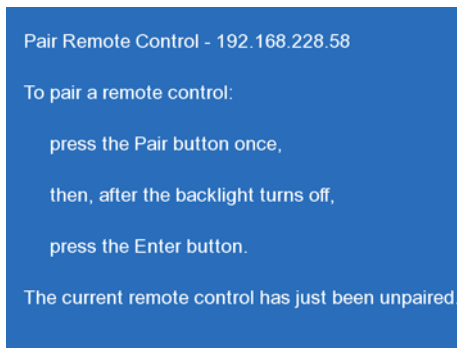


Figure 3-41 Pair Remote Control

3. Press the **Pair** button from the R100 Remote Control and then press **Enter**.
4. The message The Remote Control is now Paired appears on each tile in the array once the process is complete (**Figure 3-42**). To return to video press **Exit** on the remote.

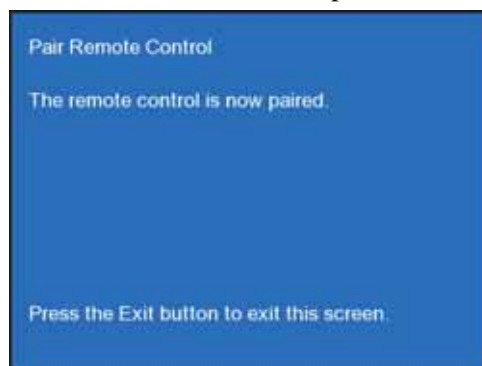


Figure 3-42 Remote Paired

5. To unpair the remote select **Unpair** from the drop-down menu on the WebUI.

3.10.7 Restore Factory Defaults

This screen is used in order to reset the ECU back to its default settings, which is typically done when setting up a new configuration or when swapping master ECUs from one configuration to another. To restore factory defaults select 1 or all ECU(s) from the spreadsheet and click **Set**.

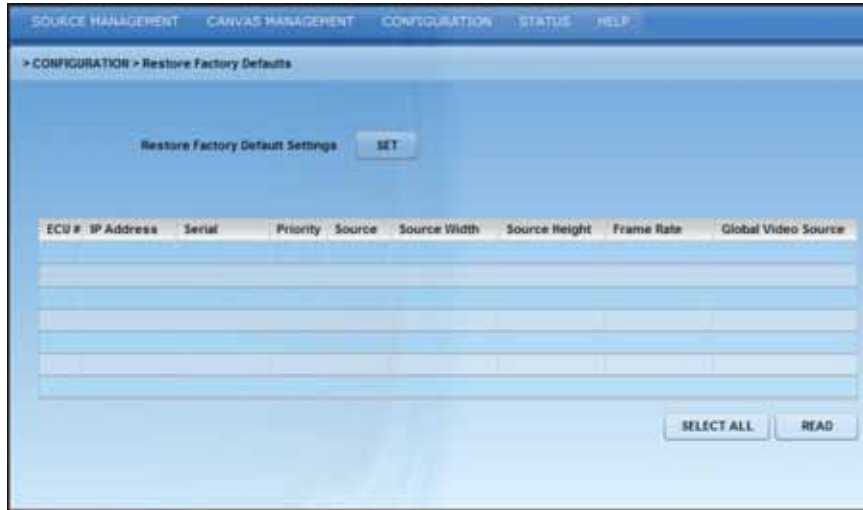


Figure 3-43 Restore Factory Defaults

3.11 Status Menu

This menu (**Figure 3-44**) allows users to view the system information for the web application, ECU and the tiles. It also provides a breakdown of the current system alerts. For information on the most common alerts and how to troubleshoot, see to **Section 5 Troubleshooting**.

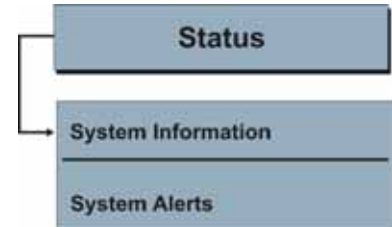


Figure 3-44 Status Menu

3.11.1 System Information - Web Application

1. Click **Status** from the top menu bar.
2. Select **System Information** from the drop-down menu.
3. Select **Web Application** from the available screen selections (**Figure 3-45**).
4. The **Date and Time** field displays the information from the ECU. The **Plug-in Version** field displays the version of Adobe® Flash Player™ used for the array.



Figure 3-45 Status >System Information>Web Application

3.11.2 System Information - ECU

This screen provides firmware version information for the ECU. The ECU spreadsheet lists information on all the ECUs connected to the master ECU. For information on how to upgrade the firmware, refer to [3.10.4 Upgrading Main Firmware, on page 3-36](#).

1. Click **Status** from the top menu bar.
2. Select **System Information** from the drop-down menu.
3. Select **External Control Unit** from the available screen selections (**Figure 3-46**).
4. Click **Read** from the bottom of the screen to populate the ECU spreadsheet. This will display each of the master and slave ECUs connected to the array. The master ECU will always state **true** in the **Main Video** column. Whichever ECU you are currently logged into will appear highlighted in the spreadsheet.
5. To view the latest version information for the ECU select it from the spreadsheet and click **Read All**.
6. To view ECU logs click **ECU Log**. This will populate a new window in Windows Explorer containing the master ECU error logs, which are used for technical support to troubleshoot any problems occurring with the master ECU.

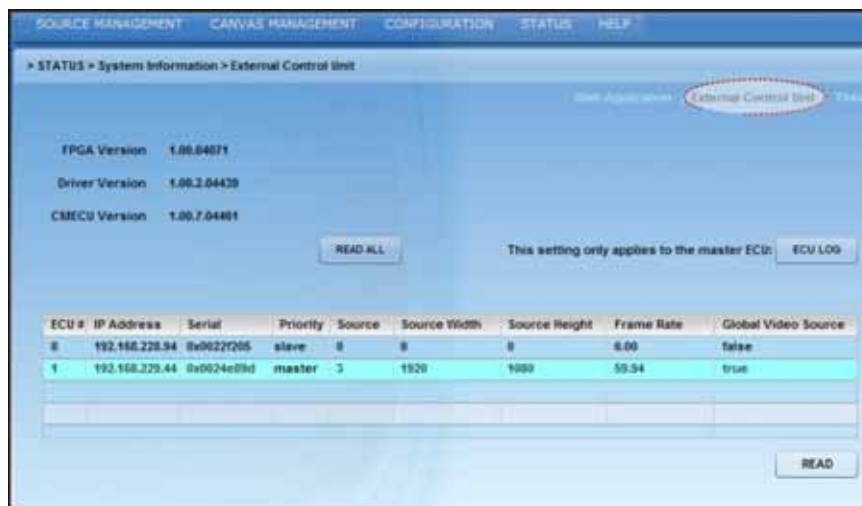


Figure 3-46 Status>System Information>External Control Unit

3.11.3 System Information - Tiles

Tile Properties

1. Click **Status** from the top menu bar.
2. Select **System Information** from the drop-down menu.
3. Select **Tiles** and **Properties** from the available screen selections (**Figure 3-47**).
4. The **Tiles** properties screen appears (**Figure 3-47**) and provides the user with system status information for each of the tiles used in the array.

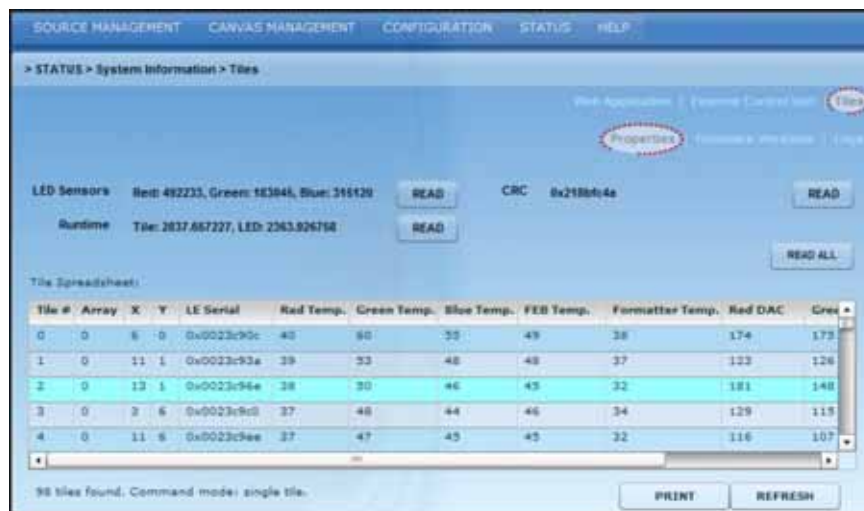


Figure 3-47 Tile Properties

5. Users are able to gain information on either the brightness values of the LED sensors, runtime values and CRC values of the selected tile by selecting a **Tile #** from the **Tile Spreadsheet** section (**Figure 3-47**) and by clicking the **Read** buttons above the spreadsheet. **NOTE:** Select **READ ALL** to import each of the features simultaneously.

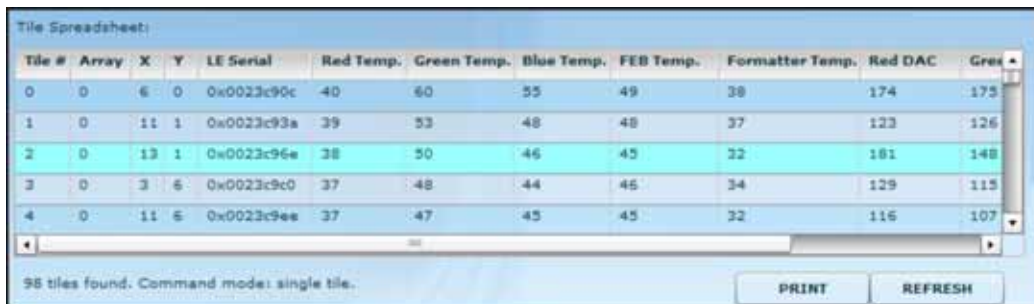


Figure 3-48 Tile Spreadsheet

6. The **Tile Spreadsheet** displays the specific operating information for each tile used in the array. Use the bottom scroll bar to view additional items.

Tile Spreadsheet Features

- **Tile #:** Number of the tile in the array.
- **Array:** Array number, where multiple arrays are controlled from one ECU.
- **XY:** XY coordinates of the tile in the array. Arrays are counted in the XY-axis and always starts from the top-left corner of the array (**Figure 3-49**).

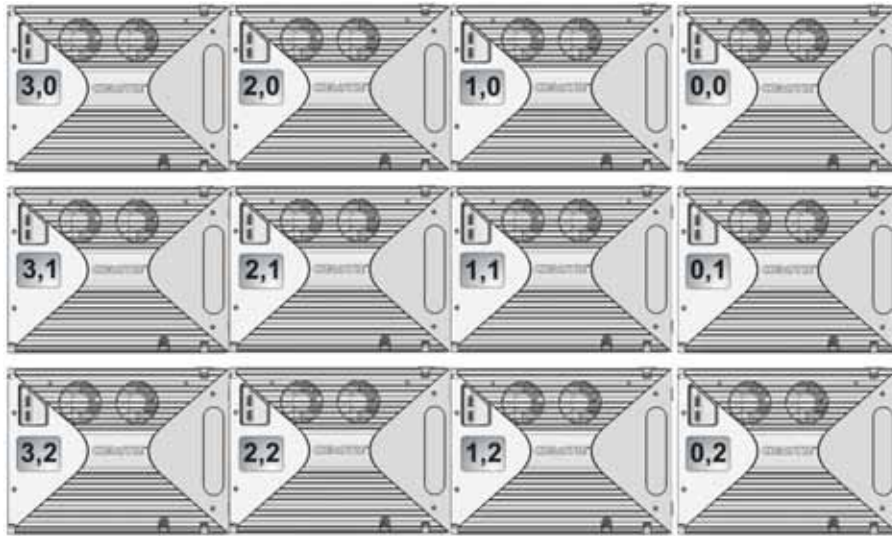


Figure 3-49 Tile Numbering Sequence (Back View)

- **LE Serial:** Light engine serial number.
- **Temperatures:** Current temperature settings for the LEDs and the FEB and formatter. If any of the three LEDs reaches its maximum temperature tolerance, the LED drive levels will dim the tiles gradually, until the minimum LED drive level is reached. If the temperature remains hot, upon reaching the minimum drive level, the light engine shuts down. The tiles remain ON and continue to communicate with the ECU.
- **Red/Green/Blue DAC:** Indicate the drive levels of the LEDs.
- **Fan 0/Fan 1:** Current operating temperature for both fans. The lower the temperature the slower and quieter the fans are running.
- **Print:** Click to print a spreadsheet of the tile schematic.
- **Refresh:** Click to update the spreadsheet information from the server.

Display Unit Firmware Versions

1. Click **Status** from the top menu bar.
2. Select **System Information** from the drop-down menu.
3. Select **Tiles** from the available screen selections.
4. Click on **Firmware Versions** to view the firmware versions for a specific tile. First, select the specific tile from the **Tile Spreadsheet** section and click **Read All** to update the screen values (**Figure 3-50**).

Web Application | External Control Tool | Log Out

Firmware Versions | Help

FPGA: 1.06.04185 ODP: 1.00.00013
 Driver: 1.06.2.04439 CMSlave: 1.06.7.04461

READ ALL

Tile Spreadsheet:

Tile #	Array	X	Y	LE Serial	Red Temp.	Green Temp.	Blue Temp.	FEB Temp.	Formatter Temp.	Red DAC	Green DAC
0	0	6	0	0x0023c90c	40	60	35	48	38	174	175
1	0	11	1	0x0023c93e	39	53	48	48	37	123	126
2	0	13	1	0x0023c96e	38	50	46	45	32	181	148
3	0	3	6	0x0023c9c0	37	48	44	46	34	129	115
4	0	11	6	0x0023c9ee	37	47	45	45	32	118	107

98 tiles found, Command mode: single tile.

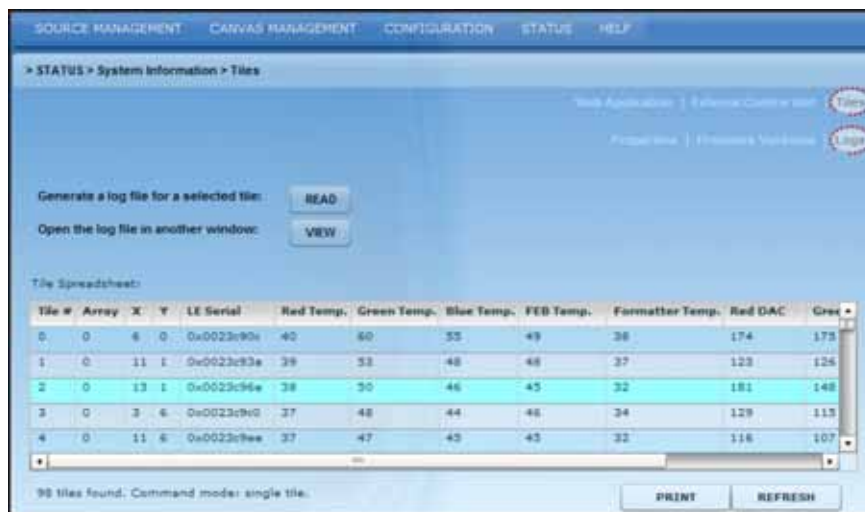
PRINT REFRESH

Figure 3-50 Status>System Information>Tiles>Firmware Versions

Tile Logs

Log files are useful for technical support to troubleshoot any problems occurring with the tiles in the array.

1. Click **Status** from the top menu bar.
2. Select **System Information** from the drop-down menu.
3. Select **Tiles** from the available screen selections.
4. Select **Logs** to display the screen shown in **Figure 3-51**.
5. Click **READ** to generate a log file from the tiles to the ECU.
6. Click **View** to generate the log file from a selected tile to the ECU. The file appears in a pop-up window through Explorer. Save this file to your PC.



Tile #	Array	X	Y	LE Serial	Red Temp.	Green Temp.	Blue Temp.	FEB Temp.	Formatter Temp.	Red DAC	Gray
0	0	6	0	0x0023c90c	40	50	55	49	38	174	175
1	0	11	1	0x0023c93e	39	53	48	48	37	123	125
2	0	13	1	0x0023c94e	38	50	46	45	32	181	148
3	0	3	6	0x0023c9d0	37	48	44	46	34	129	113
4	0	11	6	0x0023c9ee	37	47	45	45	32	116	107

Figure 3-51 Status>System Information>Tiles>Logs

3.11.4 Help Menu

When **Tool Tips** is disabled, the rollover menu tips throughout the firmware application are disabled. Select **About MicroTiles Web GUI** to view firmware licence information.



Figure 3-52 Help Menu

4 Maintenance

Installers and all other users must maintain a safe operating environment at all times. Read through this section in its entirety and understand all warnings and precautions before attempting to operate the Christie MicroTiles. For additional information, refer to the *Christie® MicroTiles™ Service Manual (P/N: 020-100332-xx)*.

4.1 Cleaning Procedures

⚠ WARNING It is critical the MicroTile array be powered OFF and disconnected from AC power before the lens or any of the covers are loosened or removed. Maintaining the cleanliness of all internal components during any service procedure is critical. A MINIMUM amount of cleaning, if any, is required during and after servicing.

4.1.1 Cleaning Inside Screen Surface

Use a soft/low lint cloth to remove any specks from the back of the Fresnel. If absolutely necessary, use compressed air to remove any loose particles. **NOTE:** Typically, dirt on the back of the Fresnel appears as a defect on the screen.

4.1.2 Cleaning Outside Screen Surface

To clean the front surface of the screen, spray Windex™ or an equivalent window cleaner onto a clean cloth. Use a dry, clean, cloth to remove any streaks. DO NOT spray cleaner directly onto the screen surface. If absolutely necessary, use compressed air to remove any loose particles.

4.1.3 Lens

⚠ CAUTION The projection lens should never be handled. DO NOT attempt to clean with commercial cleaners, such as Windex™ or equivalent cleaners.

The projection lens should never need to be cleaned; however, if it is absolutely necessary, use compressed air to remove any loose particles.

4.1.4 Light Engine Heat Sinks

In dusty environments check the heat sinks regularly to ensure airflow is not restricted. If needed, blow off dust using filtered, compressed air. The light engine must be removed to access the heat sinks. For more information, refer to the Christie® MicroTiles Service Manual (P/N: 020-100332-xx). **NOTICE!** If airflow to the heatsinks is restricted they will begin to overheat. Firmware is designed to reduce the brightness of the tile(s) when this occurs to keep the temperature level. If they continue to overheat the firmware eventually turns the LEDs OFF to prevent damage.

5 Troubleshooting

If the firmware or the MicroTiles themselves do not appear to be operating properly, note the symptoms and use the following section for assistance. If the problem cannot be resolved, contact your dealer/service representative for assistance.

5.1 Failed to Power Up

In some instances one or more MicroTiles may not power up. If that occurs, the failing MicroTiles needs to be power cycled. The easiest solution is to power cycle the entire array using the switch on the power bar; however, if the power cabling is accessible, only the failing tile (and any tiles downstream from it) can be power cycled by disconnecting the daisy chain and trying again.

5.2 WebUI Common Errors

5.2.1 Unmapped Tiles Found

The alert, illustrated in **Figure 5-1** appears on the WebUI if unmapped MicroTiles were detected by the ECU and on initial start-up. Waiting a minute after seeing video should clear this error; however, if it remains follow the steps outlined below.

To troubleshoot:

1. Select **Array Management** from the top menu bar and click on **Mapping>Automatic** from the drop-down menu (**Figure 5-2**).
2. Ensure **Automatic Mapping** is **Enabled**.

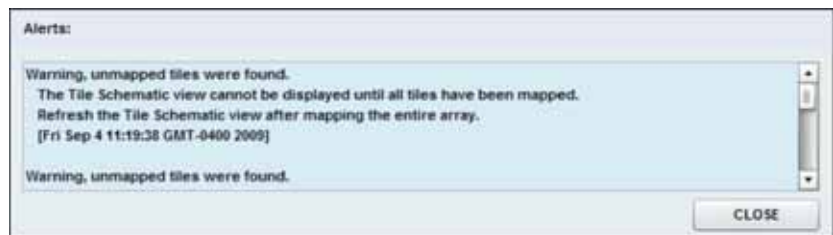


Figure 5-1 Unmapped Tiles Where Found

3. Click **Set**.



Figure 5-2 Troubleshooting: Unmapped Tiles

5.2.2 System Not Responding

If the alert shown in **Figure 5-3** appears it indicates the ECU is busy either handling input detection, handling active image inputs, monitoring tiles, etc. Wait a few seconds and try again.

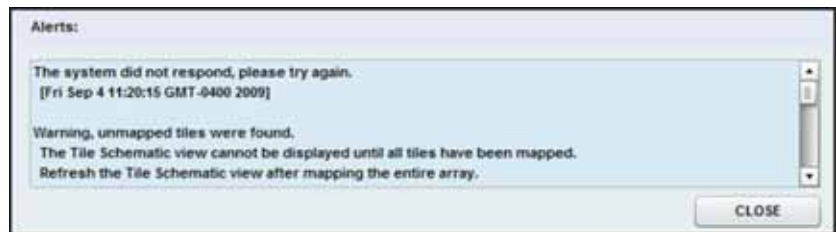


Figure 5-3 System Did Not Respond, Please Try Again

5.2.3 EDID Restore

In some instances users may need to change the EDID information through an external source in order to get the hardware to work with the MicroTiles. The alert shown in **Figure 5-4** appears when an EDID Restore was attempted, but the EDID information is invalid. When the EDID information is invalid simply perform another EDID Restore to update the information. For details, refer to [3.8.4 Customize Extended Display Identification Data \(EDID\)](#), on page 3-21.

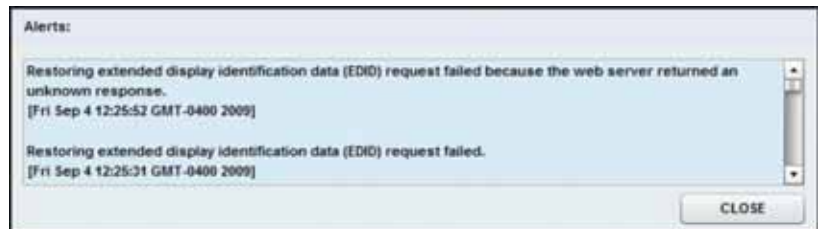


Figure 5-4 EDID Restore

6 Specifications

Due to continuing research, specifications are subject to change without notice.

6.1 General Specifications

All specifications are based on a typical canvas of tiles operating at maximum brightness with color and brightness matching enabled.

6.1.1 Model Numbers

- Display Unit: D100
- Screen: S100
- External Control Unit (ECU): E100
- Remote Control: R100

6.1.2 Display Unit Dimensions

- Height: 306mm (12.05")
- Width: 408mm (16.06")
- Depth: 260mm (10.24")
- Weight with Screen: 9.2kg (20.3 lbs.)
- Weight without Screen: 7.9kg (17.4 lbs.)

6.1.3 ECU Dimensions

- Height: 50mm (1.97")
- Width: 259mm (10.20")
- Depth: 191mm (7.52")
- Weight: 1.6kg (3.5 lbs.)

6.1.4 Display Specifications

- Screen Size (diagonal): 510mm (20")
- Native Resolution per Tile: 720 x 540
- Pixel Pitch: 0.567mm x 0.567mm
- Maximum Calibrated Brightness: 800 Nits (cd/m²)
- LED Lifespan (50% brightness): 65,000 hours
- Peak White Color Temperature: 6500K

- Adjustable Gamma: Yes
- Color Space (CIE 1931): 115%
- Optical System: DLP® 0.55" SVGA

6.1.5 Processing and Control

- Input Signal Compatibility: Single-link DVI
- Processor Bit Rate: 165M pixels per second
- Data Link Bit Rate: 5Gbps
- Maximum Video Bandwidth: 165M pixels per second
- Color Depth: 24 bits per pixel
- Color Processing: 13 bits
- Refresh Rate: 47-63Hz frame-locked
- Control Interface: Ethernet, USB 2.0, Serial

6.1.6 Power

- Christie MicroTiles Display Unit D100 Input Rated: 100-220V, 50/60Hz
- Maximum nine Christie MicroTiles on a single circuit (10A total)
- Power Consumption per Tile: 70W typical
- Heat Load per Tile s: 239 BTUs/hr typical

6.1.7 Operating Specifications

- Operating Temperature: 5°C (41°F) minimum/40°C (104°F) maximum
- Humidity: 35-85% non-condensing
- Clearance for Ventilation (rear): 50mm (2") minimum
- Vibration/Motion Limit: 0.5G
- Sound pressure per Tile: 35dB at 25°C (77°F) ambient typical
- Runtime: 24/7

6.1.8 Accessories

- Mounting brackets with each tile above five rows high (optional)
- Base feet for leveling the bottom row (optional)

6.1.9 Regulatory Approvals

- Directives (EC) 2002/95/EC (RoHS); 2002/96/EC (WEEE); Regulation (EC) No. 1907/2006 (REACH)

- CAN/CSA C22.2 No. 60950-1-03 2nd Edition
- UL 60950-1, 2nd Edition
- IEC 60950-1:2001, 2nd Edition
- FCC, Part 15, Subpart B, Class A
- EN55022/CISPR22 Class A
- EN55024 / CISPR24

6.1.10 Limited Warranty

- Two years parts and labor
- Contact an authorized Christie representative for full details of our limited warranty

6.2 Advanced Specifications

In [Section 6.1 General Specifications](#), specifications are based on a typical canvas of tiles operating at maximum brightness with color and brightness matching enabled. This is regarded as the default or typical operating condition for a MicroTiles canvas. In **Table 6.1**, additional specifications are provided under a broader range of operating conditions.

Table 6.1 Additional Specifications

Operating Condition	Item	Specification
Typical: At maximum brightness with color and brightness matched.	Power Consumption per tile	70W
	Heat Load per Tile	239 BTUs/hr
	Sound Pressure per Tile	35dB at 25°C (77°F) ambient
Maximum: AT maximum brightness, with every LED at maximum drive level, sacrificing color and brightness matching between tiles.*	Power Consumption per tile	110W
	Heat Load per Tile	375 BTUs/hr
	Sound Pressure per Tile	45 dB at 25°C (77°F) ambient

*A MicroTiles canvas is designed to achieve color and brightness matching between tiles by adjusting the drive levels of each LED in the canvas. Through this continuous process, the maximum brightness and color space of a complete canvas is lower than that of an individual tile. Operating a MicroTiles canvas without color and brightness matching enabled is not recommended.

Appendix A: OSD Menu Tree

Corporate offices

USA – Cypress
ph: 714-236-8610
Canada – Kitchener
ph: 519-744-8005

Worldwide offices

United Kingdom
ph: +44 118 977 8000
Germany
ph: +49 2161 664540
France
ph: +33 (0) 1 41 21 44 04

Hungary/Eastern Europe
ph: +36 (0) 1 47 48 100
Singapore
ph: +65 6877 8737
Shanghai
ph: +86 21 6278 7708

Beijing
ph: +86 10 6561 0240
Korea
ph: +82 2 702 1601
Japan
ph: +81 3 3599 7481

