Christie® MicroTiles®

Technical Frequently Asked Questions (FAQs)

For additional technical guidance, refer to the **Christie® MicroTiles® Specification and Application Guide** available at www.microtiles.com

August 28, 2012

Index

FAQs

1 Size and physical installation

1.1 How many tiles will I need to fit a physical space?

Simply visit www.microtiles.com and use the online Designer tool to determine how many tiles you need.

1.2 What is the maximum size of a Christie MicroTiles display?

Practically any size is possible, however, integration challenges tend to increase as the size of installation increases. Considerations include structural support, leveling and alignment, cooling, electrical distribution, signal routing, and ECU subarray layout.

For more information on integration considerations, especially when planning a large display, refer to the Specification and Application Guide available at www.microtiles.com

In terms of the DisplayPort cabling which distributes both video and control data to a group of tiles, it is recommended that no more than 200 tiles or 16 ECUs be connected together in a single loop to ensure communication integrity. If multiple loops of tiles and ECUs are required, each loop will function as an independent canvas. For information about color/brightness matching with independent canvases, refer to question 3.2 below.

1.3 How much room should I leave around the tiles?

A minimum gap of 50mm (2") is required behind the tiles for air flow and cabling. However, in order to ensure that the air behind each tile is within the operating range of 5-40°C (41-104°F), large displays may require additional space.

1.4 Do Christie MicroTiles require any additional mounting support?

Each tile contains a sturdy metal housing that allows you to build standalone displays up to five tiles high, as long as the display is adequately ballasted and secured to prevent tipping.

As a general rule of thumb, the weight of each tile above five high must be transferred to a separate supporting structure. Christie offers a bracket which attaches to the rear of the tile, enabling it to be mounted to a superstructure.

For more information on how to install and mount Christie MicroTiles, refer to the User Manual available at www.microtiles.com

1.5 Can you suspend or fly Christie MicroTiles from rigging?

Yes. In this situation, a bracket should be used on every tile.

1.6 Can Christie MicroTiles be mounted at an angle, in the floor or on a ceiling?

Christie MicroTiles can be mounted in a variety of orientations, but there are some limitations.

Angle-mounting: Brackets can be installed on each tile to allow angle-mounting. Up to 20° from vertical is supported at this time.

Floor-mounting (facing up):   This is supported; however, the tiles cannot bear weight in this orientation.

Ceiling-mounting (facing down):   This is supported, however, refer to the *Specification and Applications Guide* for more detailed guidance.

1.7 Can Christie MicroTiles be mounted in portrait orientation?

Yes. Christie MicroTiles utilize solid state technology, so they can be rotated at any angle, including both landscape and portrait orientation. However, the mechanical assembly and alignment features of Christie MicroTiles, as well as the optional mounting bracket, have been optimized for landscape orientation. In addition, screen S300 has been optimized for use in the horizontal orientation, and so viewing angles should be considered carefully.

1.8 Can Christie MicroTiles be used to create curved displays?

Yes. MicroTiles, due to their small form factor, are ideal for creating a faceted curved display, such as those common in architectural and monitoring applications. Please note:

- Tiles may be curved in either landscape or portrait configuration.

- If screen gaps need to be maintained then only a concave shape is possible (curving inwards), not convex.

- A single wall may only be curved in one direction.

- For vertical curves, angle-mounting is supported up to 20° from vertical at this time.

- When mounting adjacent tiles at an angle – in landscape orientation – the center foot cannot be used on the bottom row. Instead, use two end feet, and a rear mounting structure to maintain positioning of each column for consistent screen gaps.

- If the angle of curve between two tiles exceeds 5°, the infrared (IR) transmitter and receiver in neighboring tiles will not "see" each other. Affected tiles will need to be

manually mapped during initial setup, so that the system is aware of their physical location in the overall canvas. This is a simple, one-time process, but may be time-consuming on a large display.

- All other functionality of the tiles, including color and brightness matching, occurs through the DisplayPort cabling, and is independent of the IR neighbor detection scheme.

2 Resolution and playback

2.1 What is the resolution of Christie MicroTiles?

With Christie MicroTiles, you can achieve practically any resolution simply by adjusting the number of ECUs connected to the tiles. The more ECUs in the system, the greater your displayed resolution can be, up to a maximum of 720 x 540 pixels per tile (native resolution).

A useful rule of thumb is that one ECU can support a 1mm pixel pitch on 20 tiles at 60 Hz.

> Don't stress about how many ECUs you will need. Go to www.microtiles.com and enter the display size and resolution you want. The online Designer tool will figure out the rest.

2.2 How many ECUs are required to support native resolution on Christie MicroTiles?

The rule of thumb is that one ECU can drive up to 6 tiles at native resolution at 60Hz.

2.3 How many tiles can be driven by one ECU?

One ECU can drive up to 200 tiles. However, for almost all practical applications, a ratio of between 6-30 tiles per ECU is typical.

2.4 Do you support any other input besides DVI?

Single-link DVI is the only input supported at this time.

2.5 Will Christie MicroTiles work with any media player or digital signage software provider?

Christie MicroTiles have been tested successfully with a wide range of media players and digital signage software providers. However, non-standard resolutions should always be tested on your desired media player and software.

2.6 Do you support higher refresh rates for smoother playback?

Unlike LCD and plasma technologies, the DLP® technology inside Christie MicroTiles does not require extremely high frame rates, such as 120Hz or 240Hz, for smooth playback.

Video playback on Christie MicroTiles is very smooth, and is frame-locked for sources running at 47-63Hz. If content is supplied outside of this range, Christie MicroTiles will automatically adjust it for optimal presentation.

3 Control and calibration

3.1 How many ECUs can be connected in one loop?

Up to 16 ECUs can be connected together and control a single Christie MicroTiles display or canvas.

3.2 Is it possible to match color/brightness across two independent canvases?

In situations where there are multiple separate loops of tiles and ECUs – each is referred to as a canvas or display – any control functions will not be shared between independent canvases. This includes automatic color/brightness matching.

In this instance, it is recommended that each separate canvas be set to a fixed brightness level which can be matched comfortably by both canvases.

3.3 Can I use DisplayPort cable longer than 3m?

Each ECU ships with a 3m (9.8 ft) DisplayPort cable. For installations where the ECU must be placed further away, it is possible to use a longer, customer-supplied DisplayPort cable which complies with the high bandwidth spec of 10.8 Gb/s. However, not all high bandwidth DisplayPort cables will operate properly with MicroTiles, and external factors such as electromagnetic interference may degrade signal integrity over longer cable lengths. Refer to the *Specification and Applications Guide* for additional guidance.

3.4 Can the ECU be remotely located using a third party DisplayPort extender?

No. Third party DisplayPort extenders will not work within the system architecture of MicroTiles, because MicroTiles utilizes a proprietary signal protocol.

3.5 How are the tiles calibrated for x/y geometric alignment?

Christie MicroTiles use an 800x600 DLP® chip inside each tile. During the production process, each tile is calibrated through software so that the displayed image is geometrically aligned to the corners of the screen. As a result of this process, the native resolution of each tile is optimized at 720x540.

3.6 How does the color calibration work?

The light engine inside each tile contains three LEDs: red, green and blue. Sensors inside the light engine continuously monitor the temperature and maximum light output of each LED. Using this information, the ECU is able to make adjustments to the color space and brightness of each individual tile, so the entire display is always matched.

3.7 What brightness level is achievable at 3200K?

As with all display systems, including flat panels and projection, the color temperature of a MicroTiles canvas affects its maximum achievable brightness level. Warmer color temperatures, such as 3200K, suppress the blue light source and reduce overall light output. As a result, the maximum calibrated brightness for a typical array with S300 screens at 3200K is about 426 nits, which is ideal for broadcast applications.

The following table provides typical brightness levels that may be expected for a MicroTiles canvas, based on color temperature:

Color Temp. (°K)	Max. Calibrated Brightness	
	%	S300 (nits)
3200	71%	426
4000	82%	492
5500	95%	570
6500	100%	600
8500	80%	480
9000	77%	462

3.8 How do I match a particular color?

Typically colors look a little different on a digital display than in print, and the differences between two digital displays may be significant as well. With MicroTiles, the color space can be closely controlled because each red, green and blue LED can be adjusted individually. Color reproduction on MicroTiles can be adjusted by selecting a specific color temperature and color gamut in the WebUI. For instance, if the yellows appear to have a slight green tinge, reducing the color temperature from 6500 to 4500 will shift the white point to a warmer tone away from green.

4 Power and brightness

4.1 What is the power consumption of Christie MicroTiles?

For a typical Christie MicroTiles system with color and brightness matching enabled, power consumption ranges between 45-70 watts per tile. Power consumption can be controlled by adjusting the brightness level of the display. A maximum calibrated brightness of around 600 nits with screen S300 is achievable at 70 watts per tile.

If brightness and color matching is disabled, higher brightness and power levels are achievable, up to 110 watts per tile. When designing a cooling or electrical system, use the maximum design limit of 110 watts per tile to ensure a reasonable safety factor. However, this is not a recommended operating level.

4.2   How many tiles can be connected together in a single loop using the Y power cords?

Up to nine tiles can be connected together using the Y power cords. This limitation is based on the safety rating of the tiles, which specifies a maximum current of 1.3 amps at 100 volts, and the rating of the Y power cords, which is 15 amps. Using a safety factor of 80%, the number of tiles that can be connected together equals (15 * 0.8) / 1.3 = 9 (rounded down).

4.3   How many tiles can be connected to a 10 amp or 20 amp circuit?

When planning the number of tiles for a 10 amp or 20 amp circuit, it is recommended that 110 watts is used as a maximum power level (see FAQ: "What is the power consumption of MicroTiles?").

For example, with a 20 amp circuit at 120 volts, using a safety factor of 80%, the number of tiles that can be connected to the circuit may be calculated as follows: (20 * 0.8) * 120 / 110 = 17 (rounded down). Observing the rule that no more than nine tiles should be connected together using the Y power cords, the 20 amp circuit could support one loop of nine tiles and one loop of eight tiles.

This guidance is provided for reference only. It is the responsibility of the customer to ensure that the number of tiles on a circuit does not exceed the relevant safety factors, ratings and electrical codes for any particular application.

4.4   Why do Christie MicroTiles look brighter than alternative technologies with similar specs?

Customers frequently comment that Christie MicroTiles look brighter than alternative technologies, such as LCD, LPD or plasma displays, even if the published brightness specifications are similar. This may be in part due to the difference between controlled lab environments and the real world, where LCD, LPD and plasma screens tend to reflect a high proportion of ambient light, resulting in washed out and obscured images. One other factor to consider is the Helmholtz-Kohlrausch Effect (HK Effect), which demonstrates that displays with a wider color range, such as Christie MicroTiles, are perceived to be brighter than displays with a narrower color range.

4.5   Can I get replacement screens if the model has been discontinued?

Yes, Christie will support replacements for any discontinued models for a minimum of five years from the date of discontinuation.

4.6   Can I mix screen S300, S200 and S100 together?

The physical dimensions and attachment features are identical between the three screens, so there is nothing preventing the screens from being installed in the same display.

However, in many applications the optical differences between the screens will be apparent, especially when viewed at a wide angle. Therefore, it is not generally recommended that different screen models be mixed together.

4.7   How do I know what kind of screen I have?

If you can access the side of the screen, there is a label with the model number on it.

5   Sustainability

5.1   Are Christie MicroTiles a sustainable or energy efficient choice?

Yes. Christie MicroTiles perform well across a wide range of sustainability factors, including energy consumption (over the entire product lifecycle), durability, ergonomics, reusability and recyclability.

> For a full discussion of sustainability, go to www.microtiles.com and click on More Information and then Articles. Download the White Paper entitled *Christie MicroTiles: A Sustainable Solution*.

5.2   Are the materials used in Christie MicroTiles recyclable?

Christie MicroTiles include a solid metal housing and removable internal components, which total 80% recyclable and 90% recoverable materials. Recyclable materials are practical to reprocess into new materials and products to prevent waste. Recoverable materials include recyclable materials, and in addition any materials which are impractical to recycle but may be recovered in terms of energy.

As a reference point, the European Union Waste Electrical and Electronic Equipment (WEEE) directive mandates each Member State to be able to achieve recyclability of WEEE at 65% and recoverability at 75%. Recyclability and recoverability are estimated based on weight.

5.3   Do Christie MicroTiles comply with Restriction of Hazardous Substances (RoHS)?

Yes, Christie MicroTiles comply with RoHS, and do not include phosphors, mercury, or toxic liquid coolants.

6   Specifications

6.1   What is a nit?

A nit is a unit of measure for luminance or brightness, equal to one candela per sq. m.

6.2 What is the expected lifetime of Christie MicroTiles?

The internal components of Christie MicroTiles are extremely long-lasting and reliable. The light engine is driven by solid state LEDs rated by the manufacturer for 65,000 hours to half brightness. Ultimately, when a component needs repairing or replacing, each display unit contains three serviceable parts – light engine, fans, power supply – which can be changed in less than 15 minutes by removing the front screen.

6.3 What is the contrast ratio of Christie MicroTiles?

Christie MicroTiles offer extremely high contrast, with brilliant whites and deep blacks. Unfortunately, consumer display manufacturers currently use several different methods of measuring contrast ratios, some resulting in extremely high numbers such as 3,000,000:1, making it very difficult and confusing for consumers and even professional buyers to compare different products. In addition, unlike Christie MicroTiles, the contrast level of many display technologies significantly deteriorates when placed in a typical space with high ambient lighting, due to veiling reflections and glare. As a result, the only way to compare products is to see them side by side in the desired environment.

6.4 What is the viewing angle of Christie MicroTiles?

Christie MicroTiles offer a wide viewing angle, with a viewable image up to 180° and less color shift than many alternative technologies. However, similar to contrast ratios (see previous), the display industry uses different methods of measuring viewing angles, and the only realistic way to compare products is to see them for yourself.