Technical Reference
020-103050-04

MicroTiles LED
Serial Commands

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Notation

Learn the hazard and information symbols used in the product documentation.

⚠ (red)	Danger messages indicate a hazardous situation which, if not avoided, results in death or serious injury.
⚠ (orange)	Warning messages indicate a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ (yellow)	Caution messages indicate a hazardous situation which, if not avoided, could result in minor or moderate injury.
❗ (blue)	Notice messages indicate a hazardous situation which, if not avoided, may result in equipment or property damage.
📝	Information messages provide additional information, emphasize or provide a useful tip.

Content

Communicating with MicroTiles LED

Understand the information and procedures for communicating with MicroTiles LED from a remote location.

You can communicate with the MicroTiles LED wall controllers through RS232 or Ethernet. Using RS232 requires a USB to RS232 dongle.

Connection and use

Once you have connected your computer to the Ethernet port on the E1000 or E1100 wall controller, you can remotely access controls and setups, issue serial API commands or queries, and receive replies.

Use these bidirectional messages to:

- Control the array
- Obtain the array's status

Connecting to the controller using RS232

The controller requires the use of a USB to RS232 dongle.

Set the following RS232 communication parameters:

Parameter	Value
Baud rate	115200
Data bits	8
Parity	None
Stop bits	1
Flow control	None

Connecting to the controller Ethernet port

Communicate with the controller through the Ethernet port.

1. Connect an Ethernet cable to the controller from your computer.
2. Connect to TCP port 3002.

Understanding the message format

Commands sent to and from MicroTiles LED projectors are formatted as simple text messages consisting of a three letter function code, an optional four letter subcode, and optional data.

Available message types

Message type	Description
Set	A command to modify MicroTiles LED settings, such as configuring the device to DisplayPort mode.
Request	A request for information, such as what input mode is currently selected.
Reply	Returns the data in response to a request or as confirmation of a command.

Basic message structure

Understand the component fields that comprise a standard ASCII message.

Components	Description
Start and end of message	Every message begins with the left parenthesis character and ends with the right parenthesis character. If the start character is received before an end character of the previous message, the partial (previous) message is discarded.
Prefix characters (optional)	To acknowledge that MicroTiles LED has responded, and/or maximize message integrity, insert one or two special characters before the three-character function code: • $ (Simple Acknowledgment)—Causes a dollar sign ($) character to be sent from MicroTiles LED when it has finished processing the message. • # (Full Acknowledgment)—Causes an echo of the message as a reply to be sent from MicroTiles LED when it has finished processing the message. • & (Checksum)—Allows a checksum to be put as the last parameter in the message for verification at MicroTiles LED.
Function code	The MicroTiles LED function you want to work with is represented by a three-character ASCII code (A-Z, upper or lower case). This function code appears immediately after the leading parenthesis that starts the message. In messages sent to MicroTiles LED that do not have a subcode, a space between the function code and the first parameter (or special character) is optional.
+Subcode	The MicroTiles LED function you want to work with may have one or more subcodes that allow you to select a specific mode or subfunction. The subcode is represented by a four-character ASCII code (A-Z, upper or lower case, and 0-9). This subcode appears immediately after the function code, with a plus sign (+) character to separate the function code and subcode. If no subcode exists, the plus sign (+) is also omitted. In messages sent to MicroTiles LED that have a subcode, a space between the subcode and the first parameter (or special character) is optional.

Components	Description
Request/reply symbols	A request for information is represented by a question mark (?) that appears directly after the function code. A reply is represented by an exclamation mark (!) that appears directly after the function code or subcode, if one is provided. The first parameter located after the exclamation mark (!) reply character cannot have a space, for example (PWR!000).
Data	The value for a given MicroTiles LED state, such as on or off, appears in ASCII-decimal format directly after the request/reply symbol. You can add an optional space after the symbol—such as before the data—in a set message, but data in replies follow the exclamation mark (!) symbol without a space. Other details to remember about data: • All values returned by MicroTiles LED (reply messages) have a fixed length, regardless of the actual value. For a specific parameter, the length is always the same (for example, contrast is always returned as three characters, MicroTiles LED number is always returned as five characters). The minimum parameter size is three characters. Values less than the predefined size are padded with leading zeros as needed. Parameters which have negative signs are zero padded after the negative sign, and have one less digit to make space for the sign. • Data in set messages to MicroTiles LED do not require padding with zeros. • Within each message, multiple parameters of data must be separated by one space character. • Text parameters such as channel names are enclosed in double quotes following the data, as in "Name".
Text parameters	Most data is a numerical value; however, some messages also require text. For example, the time command requires time to be provided in text enclosed in double quotation mark, as in "19:45:23". Use all characters as required except for special characters—these require a two-character combination.

Special characters for text

To use special characters in the API commands, you must use a two-character combination.

Special character	Two-character combination	Description
"	\"	Double quotation mark
\	\\	Backslash
(	\(	Left parenthesis
)	\)	Right parenthesis

Maximizing message integrity

For additional reassurance and/or maximum message integrity, insert one or two special characters.

Message requirement	Description
Acknowledgments	For assurance from MicroTiles LED that a set message has been processed, request an acknowledgment.
	The acknowledgment is returned after the message has been received and fully executed by MicroTiles LED (such as in the case of a source switch it is not sent until the switch is complete). If the message cannot be executed for some reason (such as invalid parameters, time-out, and so on) a NAK is returned instead (not-acknowledge). Requesting an acknowledgment serves no purpose when included in a request message, as the acknowledgment is redundant to the actual reply from MicroTiles LED. However, if requested, the dollar sign ($) acknowledgment from MicroTiles LED follows the reply.
	There are two types of acknowledgments:
	• Simple Acknowledgments—Insert a dollar sign ($) character just after the start code bracket. This only returns a $. This only returns a dollar sign ($) on success, or a caret (^) on failure (NAK).
	• Full Acknowledgments—Insert a hash (#) character just after the start code bracket. This returns the message sent, as a reply.
	This is a quick way to confirm success with set messages and is useful with long distance communication links or where the images are not visible from the controller. Acknowledgments can also be a type of flow control.
Checksums	For maximum message integrity, add a checksum character ampersand (&) just after the start code bracket. You must also include the correct checksum total (0-255) just before the end code bracket. Make sure to add a space before the calculated checksum to separate it from the last data parameter:
	The checksum is the low byte of the sum of the ASCII values of all characters between the start bracket and the beginning of the checksum, but not including either. It does include the space in front of the checksum.
	Calculate the checksum for the above set contrast to 64 command as follows:
	CHECKSUM EXAMPLE = & + T + M + D + '+' + T + I + M + E + ? 'space'
	= 26h + 54h + 4Dh + 44h + 2Bh + 54h + 49h + 4Dh + 45h + 3Fh + $20h
	= 02C4h
	= C4h when only the low byte is used
	= 128
	MicroTiles LED collects all of the message bytes as defined in the first byte of the message, then creates its own checksum value for comparison with the checksum included in the controller's message. If the values match, the message is considered to have been correctly received; otherwise, the message is discarded.
	Note the following:
	• h indicates a hex number.
	• If a request message has a checksum, so does the reply.
	• If using both acknowledge and checksum, either character can occur first.

Error messages

If a command cannot be performed, a descriptive error identifying the problem appears.

For example, the following message indicates a syntax error:

```
(65535 00000 ERR00005 "TMD+TIME: Too Few Parameters")
```

Descriptive error

The following error codes indicate a problem if a command cannot be performed.

Error code	Description	Error code	Description
3	Invalid parameter	105	Disabled control
4	Too many parameters	106	Invalid language
5	Too few parameters	107	Exceeded list size
6	Channel not found	110	Communication timeout
7	Command not executed	111	Communications failure
8	Checksum error	112	Failed to set hardware
9	Unknown request	113	Bad file
10	Error receiving serial data	114	Memory failure
101	Control not found	115	Not implemented
102	Subcontrol not found	116	Invalid security
103	Wrong control type	117	Invalid access group
104	Invalid value	118	System busy - Try again later

Product documentation

For installation, setup, and user information, see the product documentation available on the Christie website. Read all instructions before using or servicing this product.

1. Access the documentation from the Christie website:
   - Go to this URL: *http://bit.ly/2DE9cnu* or
     https://www.christiedigital.com/en-us/digital-signage/products/led-tiles/microtiles-led.
   - Scan the QR code using a QR code reader app on a smartphone or tablet.

2. On the product page, select the model and switch to the **Downloads** tab.

Related documentation

Additional information on this product is available in the following documents.

- *MicroTiles LED Product Safety Guide (P/N: 020-102824-XX)*
- *MicroTiles LED Installation and Setup Guide (P/N: 020-102825-XX)*
- *MicroTiles LED User Guide (P/N: 020-102835-XX)*
- *MicroTiles LED Specifications Guide (P/N: 020-102836-XX)*
- *MicroTiles LED Status System Guide (P/N: 020-103556-XX)*
- *Replacing LED modules in a MicroTiles LED array (P/N: 020-103059-XX)*
- *Removing the MicroTiles LED chassis (P/N: 020-102670-XX)*

Serial API commands

The MicroTiles LED commands can be used to modify product settings.

BRI–Array Brightness

Sets the brightness of the array, from 0 to 100% of the array capacity.

Commands

Command	Description	Values
BRI <value>	Changes the array brightness.	Represents a percentage of the array's capability, to one decimal point. Value = 0 to 1000

Examples

Set the array to 100.0% brightness: `(BRI 1000)`
Set the array to 50.0% brightness: `(BRI 500)`
Set the array to 0.0% brightness: `(BRI 0)`
Set the array to 87.5% brightness: `(BRI 875)`

COL–System Color

Changes the color calibration settings for the system.

Commands

Command	Description	Values
COL+TEMP <value>	Sets the system color temperature. (Saved value)	3000 to 10000 (6500)
COL+TCSL <value>	Presets the target color gamuts. (Saved value)	0 = Max Gamut 2 = NTSC87 3 = NTSC53

Command	Description	Values
		4 = REC709
		5 = DCI-P3
		6 = CUSTOM

Examples

Set the system color temperature to 5000:
`(COL+TEMP 5000)`
Set the target color gamuts to NTSC87:
`(COL+TCSL 2)`

DRK–3D Dark Interval

Controls the time between frames when no image is being projected to the screen.

Only applies to: E1000 Active 3D wall controller

Commands

Command	Description	Values
DRK <value>	Configures how much time (in microseconds) the LEDs stay off between frames.	0µs to 3000µs 1333µs (Default)

Examples

Set the dark time interval to 2300µs:
`(DRK 2300)`

EME–Enable Asynchronous Serial Messages

Enables or disables the asynchronous serial messages that the controller occasionally transmits.

Commands

Command	Description	Values
EME <0 | 1>	Enables or disables asynchronous serial messages. (Saved value)	0 = Disables all asynchronous FYI/ERR serial messages 1 = Enables asynchronous FYI/ERR serial messages (Default)

Examples

Disable all asynchronous serial messages:
`(EME 0)`
Enable all asynchronous serial messages:
`(EME 1)`

GAM–Gamma Power Value

Defines the exponent used in a standard Power Law function. This command is only available if the base gamma curve is set to Power Law Function.

The GAM command cannot be used on HDR content.

Commands

Command	Description	Values
GAM <exponent>	Sets the exponent for the Power Law function used for the gamma transfer function. (Saved value)	exponent = 1000 to 3000 (2200)

Examples

Set the base gamma curve function to 2.6:
`(GAM 2600)`
Set the base gamma curve function to 1.0:
`(GAM 1000)`

LOC–Localization Settings

Sets the unit of measurement for temperature readings.

Commands

Command	Description	Values
LOC+TEMP <0 | 1>	Sets the temperature units.	0 = Celsius (Default) 1 = Fahrenheit

Examples

Set the temperature to Fahrenheit:
`(LOC+TEMP 1)`

LWC–LED Wall Controller Count

Returns the current count of Wall Controllers in the system.

Commands

Command	Description	Values
LWC+CURR	Returns the current count of Wall Controllers in the system. (Read-only)	—

OCT–Octroller Count

Returns the current count of tiles in the array.

Commands

Command	Description	Values
OCT+CURR	Returns the current count of tiles in the array. (Read-only)	—

PNG–Ping

Returns basic information to the user, including the type of device and main software version.

Commands

Command	Description	Values
PNG?	Returns basic information (Read-only): <type> <major> <minor> <build> where: • <type> = 58 (fixed value) • <major>, <minor>, <build> = Software version	<type> valid values: 58 = MicroTiles LED

PWR–Power

Changes the power state of the product.

Commands

Command	Description	Values
PWR+WALL ?	Returns the current power state of the array. (Read-only)	0 = The array is off 1 = The array is on
PWR+WALL <0 | 1>	Turns the array on or off. (Saved value)	0 = Turns the array off 1 = Turns the array on
PWR <0 | 1>	Turns the array on or off. (Saved value)	0 = Turns the array off 1 = Turns the array on
PWR+REBT 1	Reboots all components in the MicroTiles LED array.	1 = Reboot the system

Examples

Get the power status of the array: `(PWR+WALL ?)`
Power on the array: `(PWR+WALL 1)`

SIN–Select Input

Selects the active input.

Commands

Command	Description	Values
SIN+MAIN <input>	Sets which input port is used as the primary input.	E1000: 999 - Disable 0 - DP Input 1 1 - DP Input 2 2 - HDMI Input 1 3 - HDMI Input 2 200 - DP Stitched 201 - HDMI Stitched E1000-3D: 999 - Disable

Command	Description	Values
		0 - DP Input 1
		1 - DP Input 2
		2 - HDMI Input 1
		3 - HDMI Input 2
		200 - DP Stitched
		201 - HDMI Stitched
		300 - DP Dual Input 3D
		301 - HDMI Dual Input 3D
		E1100:
		999 - Disable
		4 - SDI Input 1
		5 - SDI Input 2
		6 - SDI Input 3
		7 - SDI Input 4
		8 - SDVOE
		400 - SDI Quadrant Mode
SIN+RDNT <input>	Configures which input ports are used as the redundant input. The list of available options is dependent on how the primary input is configured.	If SIN+MAIN is configured for SDI Input 1, in addition to the options above, the list of available options also include: 5 = SDI Input 2 6 = SDI Input 3 7 = SDI Input 4 If SIN+MAIN is configured for SDI Input 2, in addition to the options above, the list of available options also include: 4 = SDI Input 1 6 = SDI Input 3 7 = SDI Input 4 If SIN+MAIN is configured for SDI Input 3, in addition to the options above, the list of available options also include: 4 = SDI Input 1

Command	Description	Values
		5 = SDI Input 2
		7 = SDI Input 4
		If SIN+MAIN is configured for SDI Input 4, in addition to the options above, the list of available options also include:
		4 = SDI Input 1
		5 = SDI Input 2
		6 = SDI Input 3
SIN+OVRD <mode>	To help with testing redundant sources, set the system to work in the specified mode.	0 = Disable Source Override 1 = Force Primary Wall Controller's Primary Input 2 = Force Primary Wall Controller's Secondary Input 3 = Force Secondary Wall Controller's Primary Input 4 = Force Secondary Wall Controller's Secondary Input
SIN+RSYN	When issued, a wall controller configured for redundant input mode attempts to re-select the primary input when available. All tiles display video from the primary wall controller, when available.	

Examples

Set the main video on an E1000 to HDMI Input 1:

```
(SIN+MAIN 2)
```

Set the main video on an E1100 to SDI Input 3:

```
(SIN+MAIN 6)
```

Set the E1100 redundant port to SDI Input 4:

```
(SIN+RDNT 4)
```

Force the system to use the secondary input on the primary wall controller.:

```
(SIN+OVRD 2)
```

SNM–SNMP Configuration

Configures SNMP support for the projector.

Commands

Command	Description	Values
SNM+POWR <0 | 1>	Enables or disables power state changes. (Saved value)	0 = Do not send SNMP trap information 1 = Send SNMP trap information (Default)
SNM+READ "<password>"	Sets the password for SNMP notifications. (Saved value)	password = String value, maximum 32 characters
SNM+SIGN <0 | 1>	Enables or disables video signal changes. (Saved value)	0 = Do not send SNMP trap information 1 = Send SNMP trap information (Default)
SNM+SSTS <0 | 1>	Enables SNMP trap alerts for changes in the alert level of the array's status system. (Saved value)	0 = Do not send SNMP trap information 1 = Send SNMP trap information (Default)
SNM+TIP1 "<IP address>"	Sets the IP address for traps to be sent. (Saved value)	IP address = String value 0.0.0.0 disables notifications (Default)

Examples

Set the SNMP read community name to public: `(SNM+READ "public")`
Configure the client IP address to receive traps: `(SNM+TIP1 "192.168.1.25")`
Disable power state traps: `(SNM+POWR 0)`

SST–Status

Commands

Command	Description	Values
SST?	Returns all status items. (Read-only) Each item is listed in the following format: (SST+<group>!<index> <state> "<value>" "<description>")	group = Provides the four letter identifier of the Status System group the item belongs to index = Indicates the index value of the status item within the group state = Indicates the condition of the status item:
SST+<group>?	Returns all status items within the specified four-letter group identifier.	

Command	Description	Values
SST+<group>? <index>	Returns a specific status item within the specified four-letter group identifier. (Read-only)	000 = No errors or warnings 001 = Warning 002 = Error value = Presents the value of the status item description = Provides the descriptive name of the status item

Examples

Display the temperatures:

(SST+TEMP?)

Result:

...

(SST+TEMP!000 000 "21 °C" "Integrator Rod Temperature (Temp 1)")

(SST+TEMP!002 000 "21 °C" "Air Intake Temperature (Temp 2)")

(SST+TEMP!003 000 "21 °C" "Lamp Exhaust Temperature (Temp 3)")

(SST+TEMP!020 000 "28 °C" "Environmental Board Temperature") ...

Return item 4 of the temperature group:

(SST+TEMP?4)

Result:

SST+TEMP!004 000 "67 BOC" "Main Control Board Temperature"

SZP–Aspect Ratio

Changes the aspect ratio of the display.

By default, the system does not resize the video and displays it on the center of the canvas.

Commands

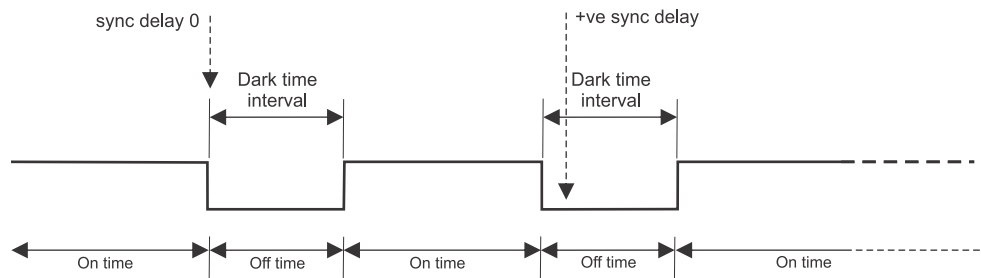| Command	Description	Values
SZP ?	Displays the current preset.	—
SZP <value>	Sets the preset size type.	1 = No Resizing (Default) 2 = Full Size (Stretched horizontally and vertically) 3 = Full Width (Stretched horizontally) 4 = Full Height (Stretched vertically) 6 = Custom (User defined canvas)

Examples

Set the size preset to full width:
`(SZP 3)`

TDD–3D Sync Delay

Configures where the sync pulse occurs in relation to the transition from on time to off time in the LEDs, in microseconds.

Only applies to: E1000 Active 3D wall controller

Commands

Command	Description	Values
TDD <value>	Configures where the sync pulse occurs. (Saved value)	0 = Lines up the sync pulse with the transition (Default) Positive value = Configures the sync pulse to be slightly after the transition Default = 6912

Examples

Line up the sync pulse with the transition:
`(TDD 0)`

TDN–Invert 3D Input

Inverts the left and right eye frames.

Only applies to: E1000 Active 3D wall controller

Commands

Command	Description	Values
TDN <0 | 1>	Inverts left and right eye frames. (Saved value)	0 = Leaves the left and right eye frames in their default order (Default) 1 = Reverses the order of the left and right eye frames

Examples

Leave the left and right eye frames in their default order: `(TDN 0)`
Reverse the order of the left and right eye frames: `(TDN 1)`

TIL–Tiles Count

Returns the last count of tiles detected in the system.

Commands

Command	Description	Values
TIL+LAST	Returns the number of tiles in the array when the system was last on. (Read-only)	Numeric value
TIL+CURR	Returns the number of tiles currently in the array. (Read-only) When the array is in standby mode, the number of tiles is registered as 0.	Numeric value

Examples

Display the number of tiles in the currently powered on array: `(TIL+CURR)`

TMD–Time and Date

Sets the display time and date for all devices in the MicroTiles LED array.

Commands

Command	Description	Values
TMD+DATE <date>	Sets the date for the clock.	<date> = String in the following format:

Command	Description	Values
		YYYY/MM/DD
TMD+TIME <time>	Sets the time for the clock.	<time> = String in the following format: hh:mm:ss

Examples

Set the date to January 17th, 2023:
```
(TMD+DATE "2023/01/17")
```
Result:
```
(65535 00000 FYI--916 "Setting Date to 2023/01/17")
```

Get the local time:
```
(TMD+TIME?)
```

Set the time to 3:00 pm:
```
(TMD+TIME "15:00:00")
```
Result:
```
(65535 00000 FYI0916 "Setting Time to 15:00:00")
```

UID–User ID

Changes the access level of the currently connected session.

Commands

Command	Description	Values
UID?	Displays the current logged in user.	04 = Default User 05 = Admin 06 = Service
UID <username> <password>	Logs in using the specified user name and password.	username = String value password = String value

Examples

Log in as service:
```
(UID "service" "<password>")
```

VID–Refresh Rate Priority

Switch between bit depth priority and refresh rate priority.

Commands

Command	Description	Values
VID+HREF <0 | 1>	Toggles the system between bit depth priority, resulting in better color, and high refresh rate priority, which produces less flicker.	0 = Bit Depth Priority, 1920Hz at 14-bits (Default) 1 = Refresh Rate Priority, 3840Hz at 13-bits

Examples

Change the refresh rate priority to bit depth priority: (VID+HREF 0)

WDM–Wall Dimension Window

Defines the size and the position of the video signal relative to the array.

Commands

Command	Description	Values
WDM+LFTE <value>	Defines the left coordinate of the Video Output Signal, in pixels. (Saved value)	value = Positive or negative number
WDM+TOPE <value>	Defines the top coordinate of the Video Output Signal. (Saved value)	value = Positive or negative number
WDM+HGHT <value>	Defines the height of the Video Output Signal, in pixels. (Saved value)	value = 45 to 4096
WDM+WIDH <value>	Defines the width of the Video Output Signal, in pixels. (Saved value)	value = 120 to 4096

Examples

Set the left coordinate of the signal, in pixels, to 0: (WDM+LFTE 0)
Set the height of the video output signal to 1080 pixels: (WDM+HGHT 1080)