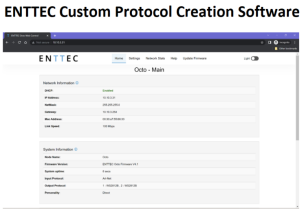

ENTTEC Custom Protocol Creation Software User Guide

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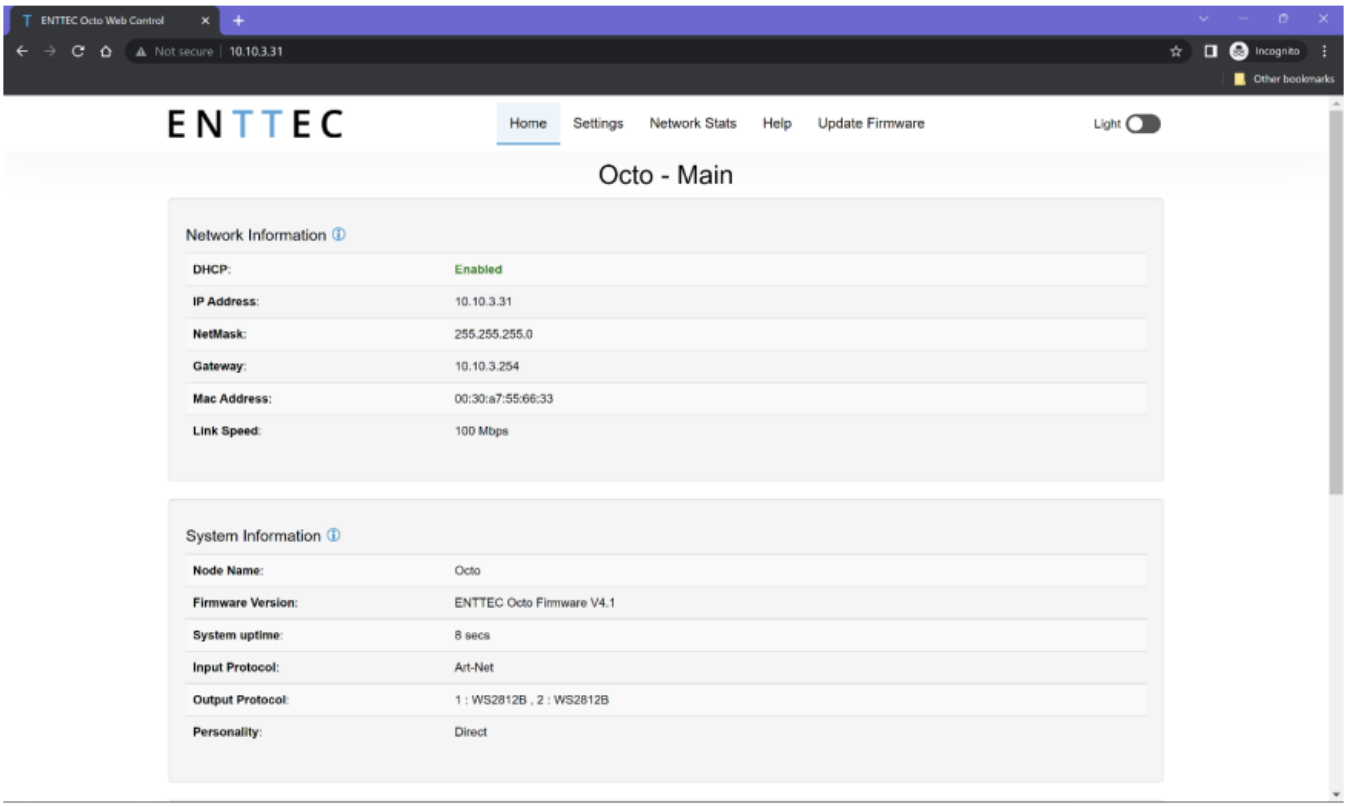
ENTTEC

ENTTEC Custom Protocol Creation Software



Specifications:

- Product Models: DIN PIXIE (73539), PIXELATOR MINI (70067), OCTO MK2 (71521)
- Firmware Versions: DIN PIXIE V2.0 and up, PIXELATOR MINI V2.0 and up, OCTO MK2 – V4.0 and up

Product Information

The ENTTEC Pixel controllers support over 20 pixel protocols by default. The Custom Protocol Creation feature allows users to create a custom protocol for pixel fixtures that meet specific criteria without the need for new firmware.

Usage Instructions

Guide Overview:

1. Match your pixel tape to the existing protocol by verifying 2 key criteria.
2. Enable custom protocol in the Output Settings.
3. Set custom voltage timing.

Setup Requirements:

- The datasheet of the desired pixel fixture for key criteria verification.
- A device like a computer to access the device settings page.
- For DIN PIXIE: Configuration software EMU Software.

Step-by-Step Guide to Custom Protocol Creation:

1. **Step 1:** Match your pixel tape to the existing protocol by verifying 2 key criteria.
    - **Data Structure:** 24bit, 32bit, 48bit, 64bit
    - **Transmission Method:** No additional bits, Additional 64bit constant value
2. **Step 2:** Enable custom protocol in the Output Settings.
3. **Step 3:** Set custom voltage timing.

FAQ

Q: What if I cannot find a matching LED protocol for my desired fixture?

A: In such cases, reach out to the dealer or manufacturer for assistance in creating a custom protocol based on the fixture's specifications.

A convenient and time-saving DIY solution for users to control pixel fixtures (two criteria apply).

Document Version:	3
Last Updated:	24.Oct.2023

Eligible Devices

Product SKU	**Firmware Version**
73539	DIN PIXIE V2.0 up
70067	PIXELATOR MINI V2.0 up
71521	OCTO MK2 – V4.0 up

INTRODUCTION

ENTTEC Pixel controllers default to support more than 20 pixel protocols in the device. In the event of missing protocol, this custom feature allows the users to create a custom protocol for the desired pixel fixture anytime (two key criteria apply) without having to submit a support request for new firmware. Within this document is the setup instruction for custom pixel protocol creation, alongside the guide on criteria verification. The creation requires the user to first match the desired pixel protocol to the existing protocols (as per two key criteria). Next, select the compatible pixel protocol offered in the dropdown list followed by adjusting the pixel fixture's data voltage timing (according to the manufacturer datasheet) on the web interface where applicable.

Table 1 below provides an overview of the step-by-step guide

GUIDE OVERVIEW	
Step 1	Match your pixel tape to the existing protocol by verifying 2 key criteria.
Step 2	Enable custom protocol in the Output Settings.
Step 3	Set custom voltage timing.

SETUP REQUIREMENTS

To create a custom protocol, the following are required:

1. The datasheet of the desired pixel fixture is required to verify key criteria for eligibility and to obtain information for creation. Reach out to the dealer or the fixture manufacturer for a datasheet.
2. A device such as a computer to access the device setting page.
3. For OCTO MK2/PIXELATOR MINI: Device IP address – this can be a DHCP or static IP address depending on your network settings. Discoverable with the ENTTEC EMU app.
4. For DIN PIXIE: Configuration software EMU Software

STEP-BY-STEP GUIDE TO CUSTOM PROTOCOL CREATION

Step 1: Match your pixel tape to the existing protocol by verifying 2 key criteria

1. Data Structure and Transmission Method are the 2 key criteria in the Custom Protocol Creation feature which supports: 4 types of Data Structure and 2 types of Transmission Method.

2 Key Criteria	
Data Structure	**Transmission Method**
24bit (8bit x 3 channels) 32bit (8bit x 4 channels) 48bit (16bit x 3 channels) 64bit (16bit x 4 channels)	No additional bits: D1-D2…Dn Additional 64bit constant value: C1-C2-D1-D2….Dn

2. Refer to Appendix section to learn more on how to verify the 2 key criteria of your desired protocol.
3. Highlighted in Table 3 below are 3 matching LED protocols recommended for use during protocol creation. (See Step 2.2)

For example, if your desired pixel fixture's Data Structure is 24bit and the Transmission Method is D1-D2…Dn with no additional bits, WS2812B is the recommended protocol to continue in Step 2.2

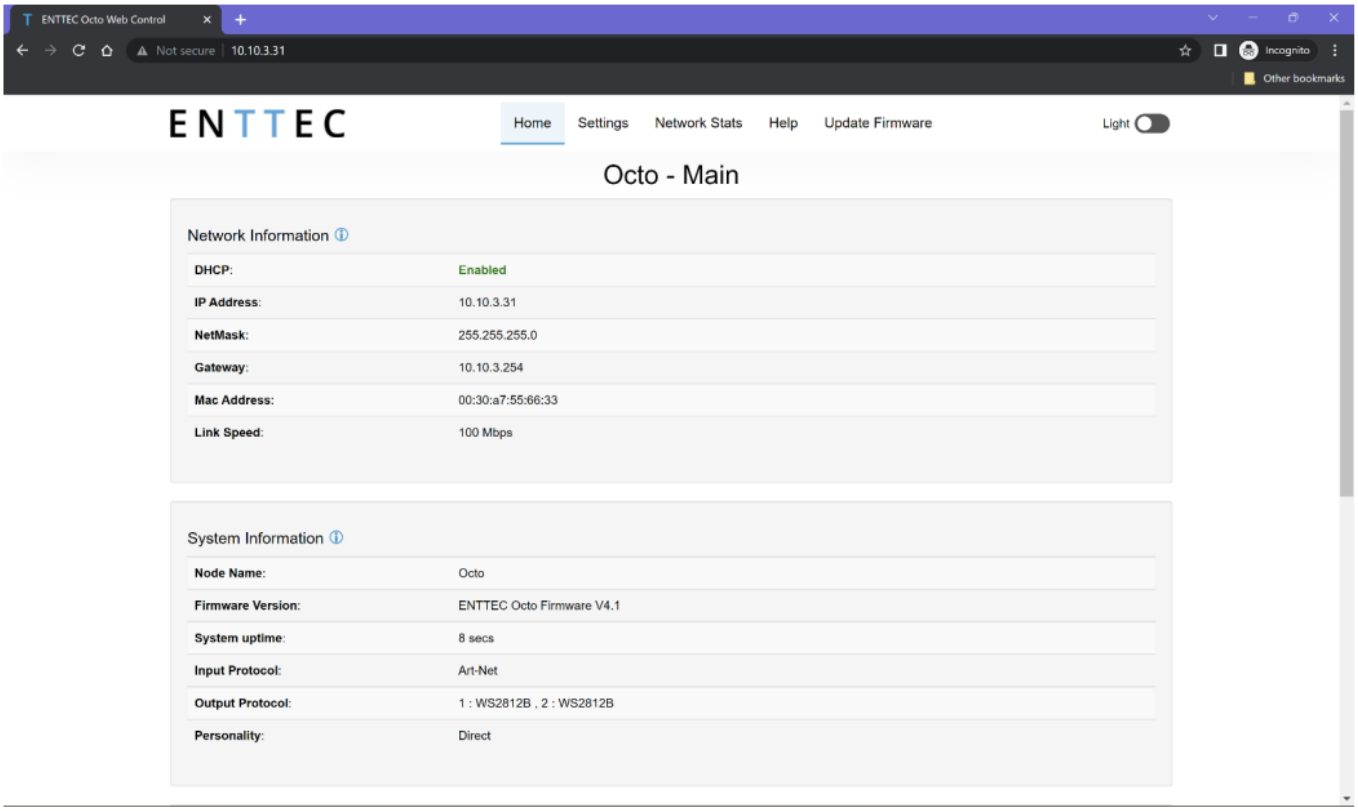
Data Structure **Transmission Method**	24bit 8bit x 3 channels	32bit 8bit x 4 channels	48bit 16bit x 3 channels	64bit 16bit x 4channels
No additional bits D1-D2…Dn	WS2812B		UCS8903-16bit	
Additional 64bit constant v alue C1-C2-D1-D2….Dn	Not supported	TM1814	Not supported	Not supported

Table 3 – Table of the nominated protocol that matches your pixel fixture by verifying Data Structure and Transmission Method

Step 2: Enable custom protocol in Settings page

For OCTO MK2/PIXELATOR MINI

1. Access to OCTO MK2/PIXELATOR MINI web interface
2. ENTTEC recommend Google Chrome as the web browser to access the OCTO MK2/PIXELATOR MINI web interface.
3. Free ENTTEC app, EMU can be used to retrieve OCTO MK2/PIXELATOR MINI IP address. See ENTTEC website www.enttec.com to download the app.
4. After entering the IP address of OCTO MK2/PIXELATOR MINI, the user will land on the Home page of OCTO MK2/PIXELATOR MINI.



An example of OCTO MK2 homepage in Figure 1 indicates IP address 10.10.3.31, which was assigned by the DHCP server. For out-of-box OCTO MK2/PIXELATOR MINI that is connected directly to a computer (no DHCP server), the default IP address will be 192.168.0.10.
See OCTO MK2/PIXELATOR MINI User Manual ‘Networking’ section for more information

Navigate to Settings page – Output Setting

Go to the output where the desired pixel fixture is connected to. Pick pixel protocol from dropdown list that shares the same data structure and transmission method verified in Step 1.3.

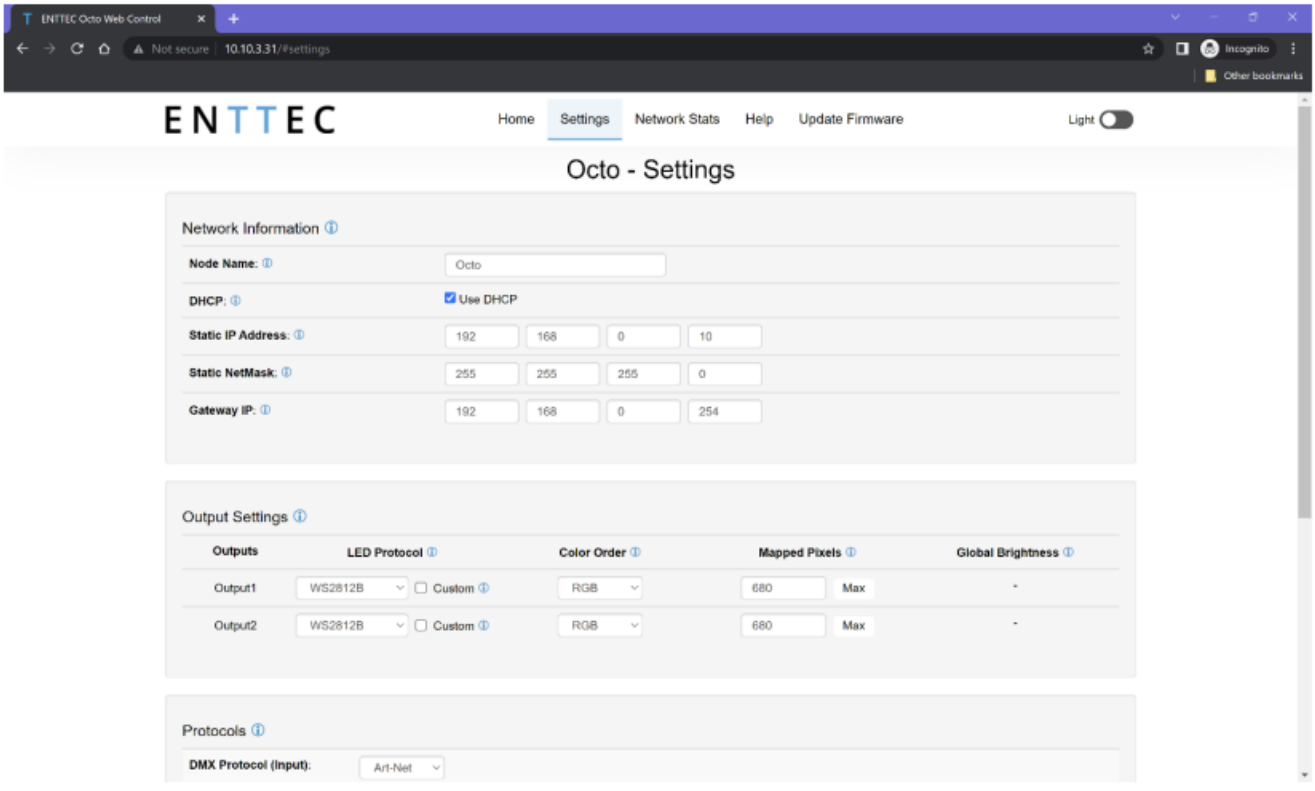


Figure 2 – Example of OCTO MK2 Settings Page

Enable Custom protocol

Enable the ‘Custom’ tick box to access the data voltage timing setup. Untick to disable the custom protocol.

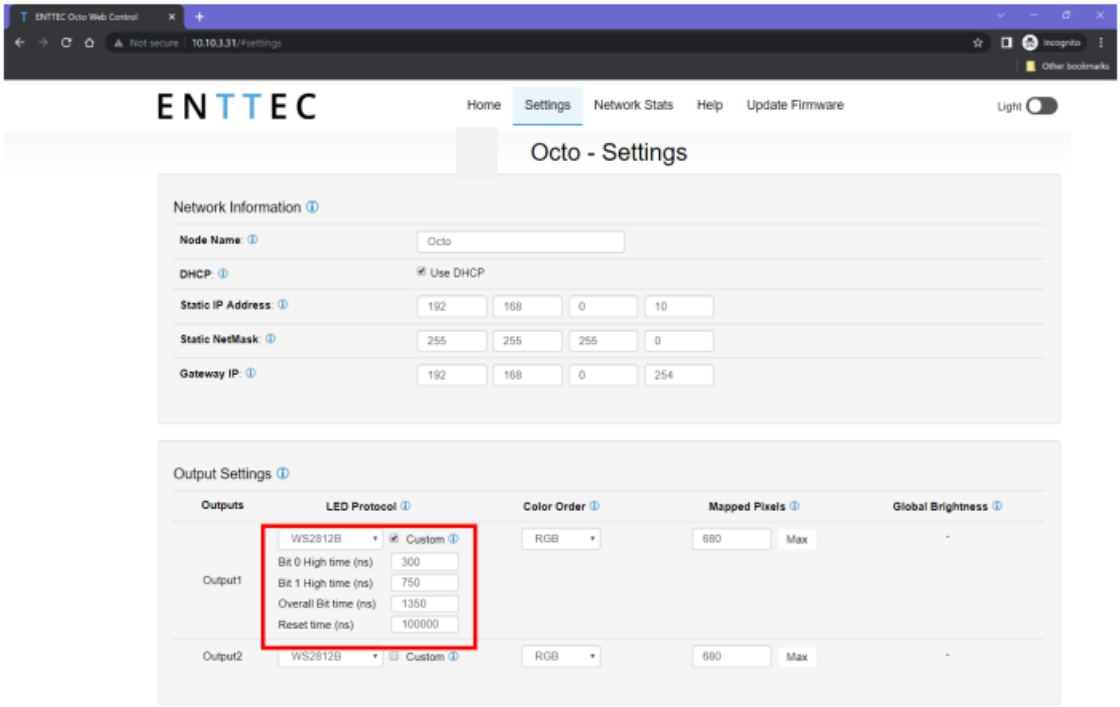


Figure 3 -Example of OCTO MK2 Custom field after enabling 'Custom' tick box

For DIN PIXIE

1. Connect DIN PIXIE to the computer using USB Type-B
2. Launch EMU Software
3. Scan for device and Click on the Conf of the discovered DIN PIXIE

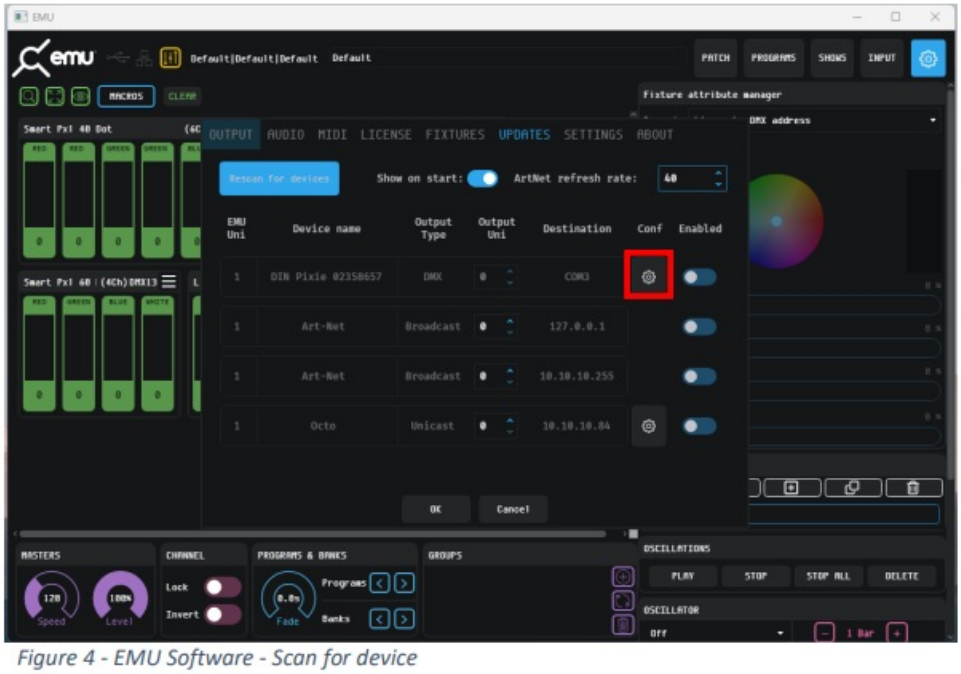


Figure 4 - EMU Software - Scan for device

4. Enable Custom Protocol

   Pick pixel protocol from the dropdown list that shares the same data structure and transmission method verified in Step 1.3 and enable Custom.

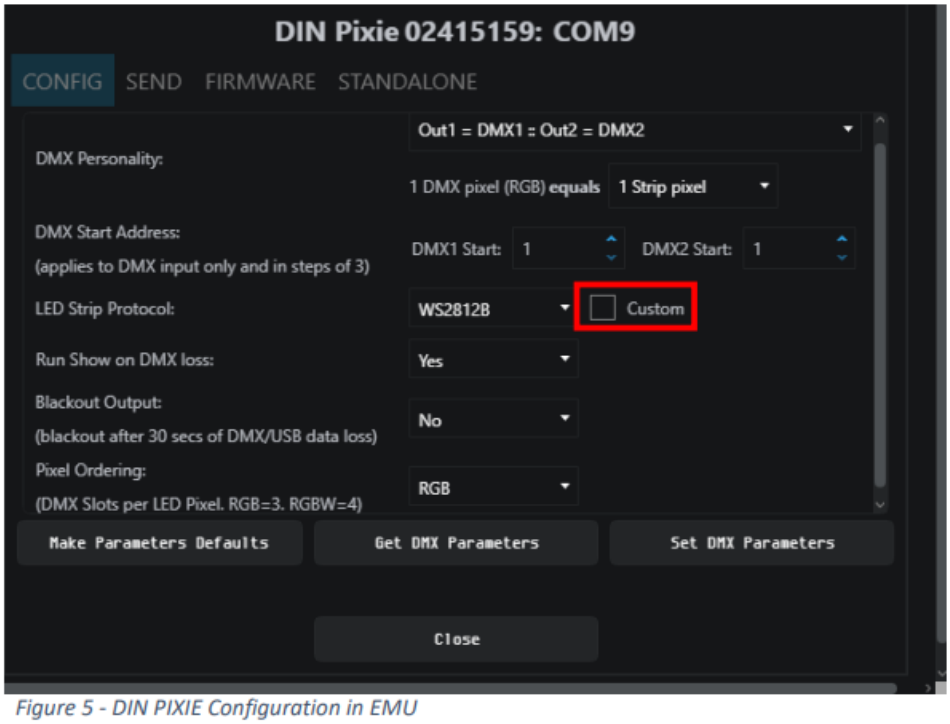


Figure 5 - DIN PIXIE Configuration in EMU

Step 3: Set custom voltage timing

1. Custom Protocol requires 4 inputs to complete data voltage timing adjustment:

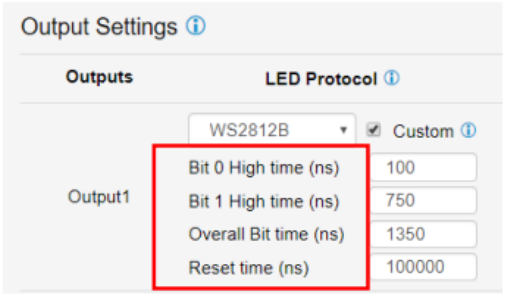


Figure 6 - Custom Voltage Timing values

Voltage Timing Definition	
Bit 0 High Time (T0H)	The voltage high time required for code 0.
Bit 1 High Time (T1H)	The voltage high time required for code 1.
Overall Bit Time:	The total voltage time for a single bit. Lower limit = T0H+T0L Upper limit = T1H+T1L
Reset Time	The total voltage low time required to reset the data transmission between each data batch.

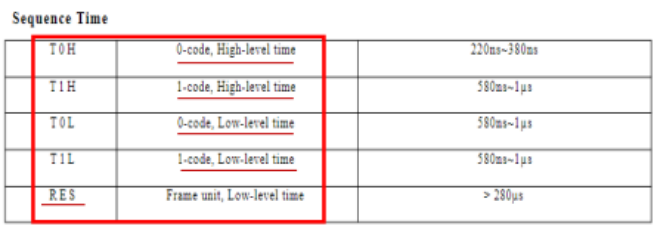
Table 4 - Definition of Voltage Timing values

2. Datasheet – Data voltage timing info Example

From WB2818B's datasheet

Fill the voltage timing range in the custom field in Output Settings (Figure 6).

Locate '**Sequence Time**' table (Figure 5) in WB2818B's datasheet for voltage timing range.



Sequence Time

T0H	0-code, High-level time	220ns~380ns
T1H	1-code, High-level time	580ns~1μs
T0L	0-code, Low-level time	580ns~1μs
T1L	1-code, Low-level time	580ns~1μs
RES	Frame unit, Low-level time	>280μs

Figure 7 - Voltage Timing from WB2818B Datasheet

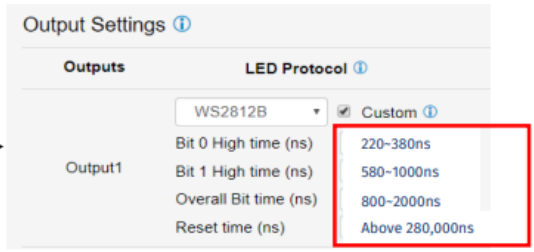


Figure 8 - Datasheet information interpreted into LED Protocol's custom field

IMPORTANT

- ENTTEC recommend taking the median value of the range for start.
- The user will have to SAVE settings for the modified value to take effect.
- Fine adjustment of value required, followed by actual output test to optimise the custom protocol for pixel fixture control.
- ENTTEC recommend a trial run on the actual setup before finalising the custom protocol setup.
- Typical issue of incorrect setup include and not limited to failure to light up and output flickering.

CONCLUSION

This guide demonstrated how to set up a custom protocol for eligible ENTTEC devices, alongside the technical knowledge in the Appendix on how to verify the 2 key criteria from the datasheet of your desired pixel fixtures. By following these steps, the user can create a custom pixel protocol that is not in the drop-down list anytime without waiting for technical support or a new firmware release. However, if you still have questions or have difficulty finding the right information, reach out to our friendly support team in the local offices.

APPENDIX

Two key criteria for custom pixel protocol

For custom output protocol creation, the desired pixel fixture must meet two key criteria:

- A. Data structure
- B. Data Transmission Method

2 Key Criteria	
Data Structure	**Transmission Method**
24bit (8bit x 3 channels) 32bit (8bit x 4 channels) 48bit (16bit x 3 channels) 64bit (16bit x 4 channels)	No additional bits: D1-D2…Dn Additional 64bit constant value: C1-C2-D1-D2….Dn

A. Data Structure

A.1. This is how pixel data are formatted. There are 2 sub-compositions.

- Data bit: 8bit or 16bit
- Channel number: 3 channels – RGB or 4 channels – RGBW (colour order doesn't matter).

A.2. This feature supports 4 combinations

Data Structure		
Channel Data Bit	3 channels (RGB)	4 channels (RGBW)
8bit	24bit	32bit
16bit	48bit	64bit

- A.3. Datasheet – Data Structure info example:
- A.3.1. WB2812B's datasheet (24-bit):

Figure 7 (adapted from the datasheet) indicates the composition of 24bit data with G7-G0, R7-B0, and B7-B0. As a result, the Data Structure of WB2812B is made of 8bit of G (green), B (Blue) and R (Red) each = 8bit x 3 channels (GRB) = 24bit

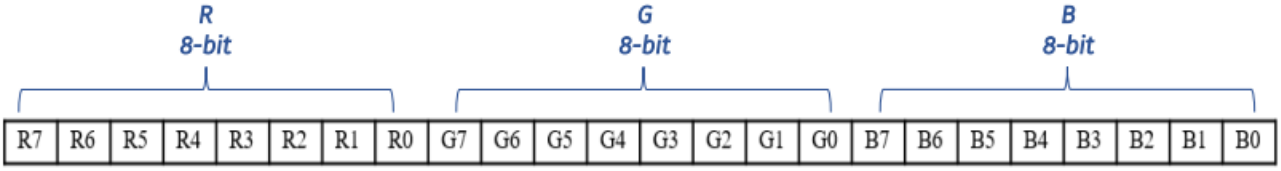


Figure 9 – Data structure information from WB2812B Datasheet

A.3.2. TM1814's datasheet (32-bit):

Figure 8 (adapted from the datasheet) indicates the composition of 32bit: W7-W0, R7-R0, G7-G0 and B7-B0. As a result, the Data Structure of TM1814 is made of 8bit of W (White), R (Red), G (Green) and B (Blue) each = 8bit x 4 channels (WRGB) = 32-bit

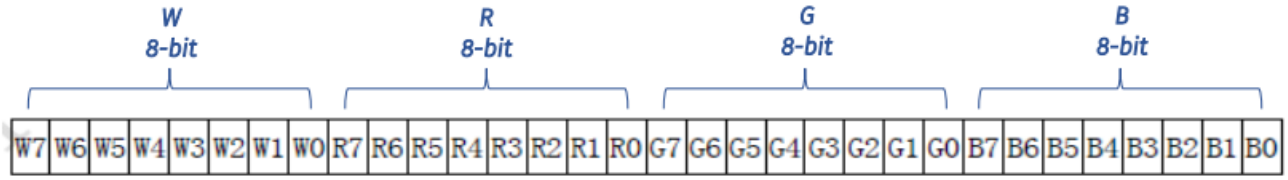


Figure 10 - Data structure information from TM1814 Datasheet

A.3.3. UCS8903's datasheet (48-bit)

Figure 9 (adapted from the datasheet) indicates the composition of 48bit: R15-R0, G15-G0 and B15-B0. As a result, the Data Structure of UCS8903 is made of 16 bits of R (Red), G (Green) and B (Blue) each = 16 bits x 3 channels (RGB) = 48-bit.

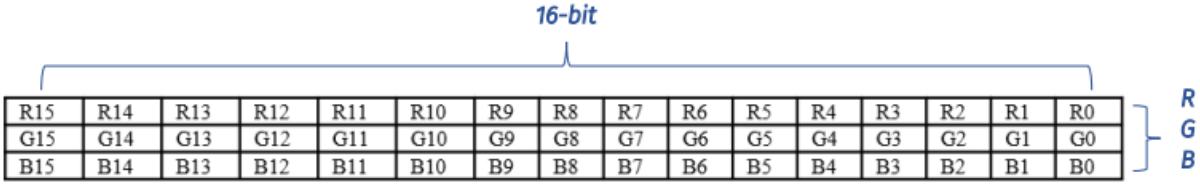


Figure 11 – Data structure information from UCS8903 Datasheet

A.3.4. UCS8904B's datasheet (64-bit):

In the event that there is a lack of pictorial depiction of Data Structure in the datasheet, the product description implies information to help with structure verification. For example, in the UCS8904B datasheet description such as: "4 channels", which means RGBW. "65536 levels of true gray" indicates a numerical formula equivalent to 164

– which means 16bit x 16bit x 16bit x 16bit This reaches the conclusion of 16bit x 4 channels (RGBW) = 64-bits.

B. Data Transmission Method (also known as data cascade method)

B.1. This is how data are transmitted, and there are 2 main categories.

This feature supports both categories:

- D1-D2-D3…Dn: Data is transmitted without additional bits.
- C1-C2-D1-D2-D3…Dn: Data is transmitted with additional C1 & C2 Constant Value (64bit).

Transmission Method	
D1-D2…Dn No additional bits	**C1-C2**-D1-D2…Dn Additional 64bit Constant Value

B.2. Datasheet – Data Transmission info Example:
B.2.1. WB2812B's datasheet (D1-D2-D3…Dn):

Figure 10 (adapted from datasheet) indicates data transmission by D1-D2-D3-D4 between pixels.

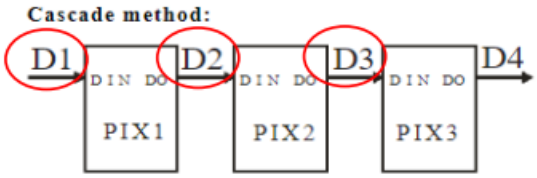
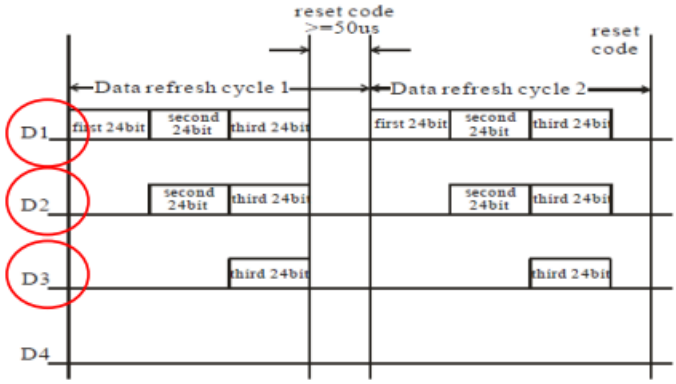


Figure 10 - Cascade Method in WB2812B Datasheet

Figure 11 (adapted from datasheet) shows each D1, D2, D3 are transmitted with data batch of 24bit (8bit x 3 channels) without additional bits on start and end of data.



B.2.2. TM1814's datasheet (C1-C2-D1-D2-D3…Dn):

Figure 12 (adapted from datasheet) indicates 'Data receiving and forwarding' with S1-S2-S3-S4 between pixel (chip)

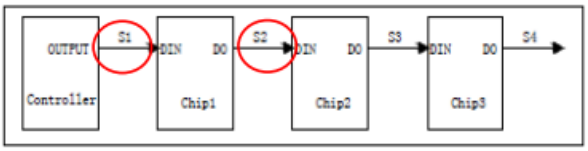


Figure 12 - Data Receiving and Forwarding in TM1814 Datasheet

Figure 13 (adapted from the datasheet) shows how S1, S2, S3 are transmitted with extra C1-C2 in the front of data batch.

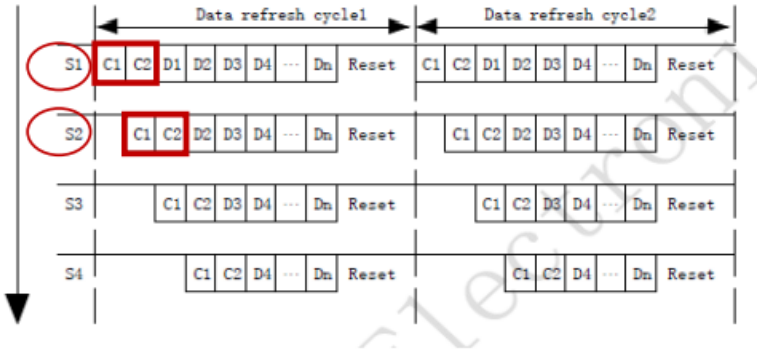


Figure 12 - Data Transmission and forwarding process in TM1814 Datasheet

Due to constant innovation, information within this document is subject to change.

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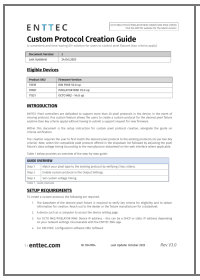
Documents / Resources

	ENTTEC Custom Protocol Creation Software [pdf] User Guide 73539, 70067, 71521, Custom Protocol Creation Software, Protocol Creation Software, Creation Software, Software

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- ENTTEC | Lighting control experts : ENTTEC
- User Manual