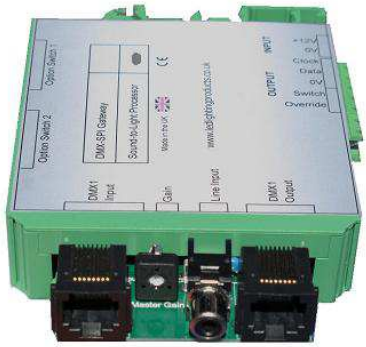
Cromatix DMX-SPI Processor / DMX Sound-To-Light Processor

SPIP / STLP

Product Datasheet



Abstract

With the huge rise in popularity of pixel LEDs and 'dream' striplights, Cromatix have developed a feature-rich DMX to SPI converter with optional sound activated features. This allows any DMX controller to control pixel or dream LED products.

The direct conversion mode converts upto 400 DMX channels to maintain the standard DMX refresh rate of 40Hz. This equates to approximately 15m of LPD6803 strip or 5m of WS2811 strip. For longer runs there is a scaling option that enables very long runs of strip to be connected. For instance, in an installation with a 50m run of LPD6803 strip the scale would need to be set to 4.

As pixel LEDs can consume a large amount of DMX channels, there are a number of built-in modes that address several thousand pixel channels with just a handful of DMX channels. These modes are particularly suited to installations that use simple DMX controllers or for customers who want to use a simple, free or low-cost mobile app that only have a limited number of DMX channels available.

When specified with the optional sound processing modes the unit responds to sound via its internal microphone or line input, with a number of chasing, strobing and VU type effects, ideal for the smaller club or bar, or home applications.

Contents

Key Features (SPIP Only)

- Compatible with WS2811 and LPD6803 protocols
- Decodes 512 DMX channels and converts to SPI for running pixel light shows
- Unique built-in functions control hundreds of LEDs from just a few DMX channels
- Compatible with any light in the Cromatix or Nsync range
- Green/Blue swap option corrects the wiring error on many Far-Eastern products
- Convenient DIN Rail mounting
- 5mm Pluggable Terminal Blocks for Easy Connection
- Buffered DMX Out signal
- Two sets of Buffered CLK and DOut (Data Out) Signals for reliable communication
- RJ45 Connections for DMX in and DMX out
- 12v operation

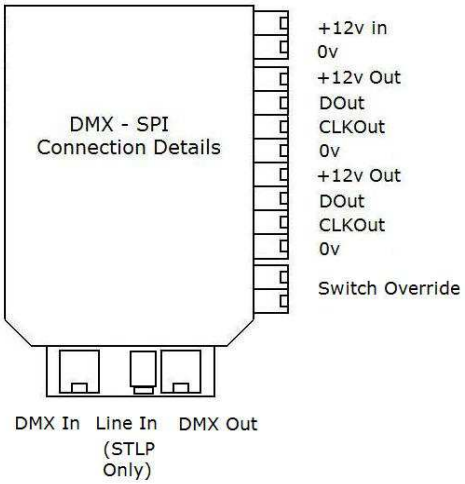
Features For Optional Sound To Light Processor (STLP)

- Has all the features of the above but includes:
- Comprehensive range of sound-activated functions
- DMX channels selectable by DMX to suit the size of installation
- Sound functions are customisable for response speed
- DMX controlled noise threshold compensates for noisy sound sources
- Selectable phono line input or built-in microphone
- Adjustable master gain control
- Sound functions are enabled by DMX or switch override
- DMX input is mirrored to a buffered DMX output

Electrical Characteristics

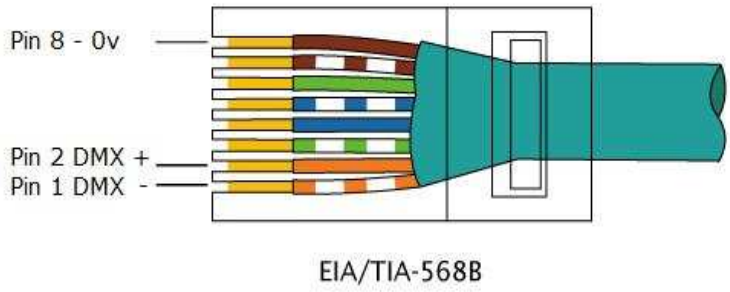
Recommended Operating Voltage	Typical Operating Current	Typ Operating Power (W)
12vdc	120mA	1.5W

Wiring The Unit



IMPORTANT NOTE: Most LED strips using the WS2811 protocol require a 5v feed. Connecting them to 12v will cause irreparable damage.

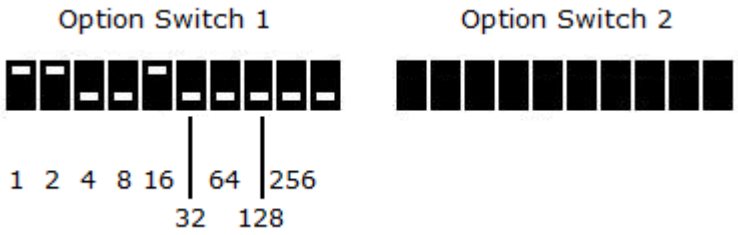
DMX Connection Details



The DMX input and output are wired identically. Please note that the DMX input has a 12v feed on pin 5 so that controllers can be connected with a single jack.

Setting the DMX Base Address

The DMX base address is selected by Option Switch 1 in a standard binary format. It is highly recommended to keep the base address as low as possible. This frees up processing time and helps to maintain the refresh rate.

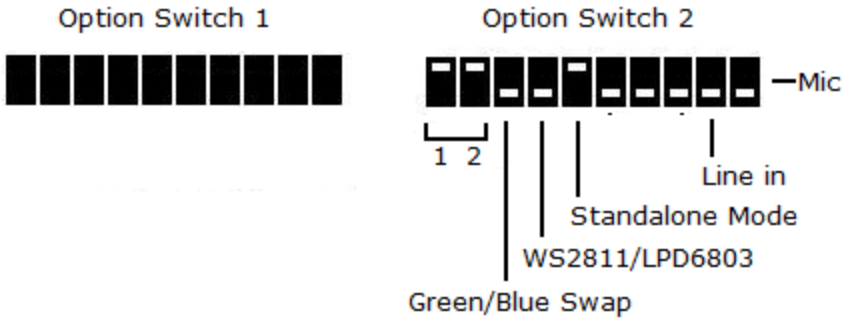


The DMX base address in the example above is as follows:

1 + 2 + 16 = 19.

Selecting The Operating Mode

The operating mode is set by Option Switch 2 as follows:



The mode is selected by adding together the numbers represented by the first two switches. In the example above the mode is 1 + 2 = 3. The modes act as follows:

Mode	Effect
0	Direct DMX-SPI Conversion (400 channels)
1	Direct DMX-SPI Conversion (200 channels)
2	Direct DMX-SPI Conversion (100 channels)
3	Enhanced DMX-SPI Conversion

The modes are tabulated later.

Green/Blue Swap

Some of the Far-Eastern built 'Dream' strips with the LPD6803 chip have a non-standard connection that means that the strips are RBG, not RGB. As many DMX controllers do not support RBG units, we have provided a convenient means of swapping blue and green so the strips may be used with RGB DMX controllers.

As it is not clear from the LPD6803 datasheet which is 'correct', the position of the switch may need to be experimented to get the correct response.

WS2811/LPD6803 Selection

Flipping the switch UP selects WS2811, DOWN selects LPD6803.

DMX Mode Summary

Direct DMX-SPI Conversion (Modes 0 - 2)

These modes simply decode DMX, convert to SPI and send out. These modes are ideal for intelligent software based DMX consoles such as provided by Artistic Licence, Traxon, Nicolaudie, Chromateq etc. In these cases all the processing is done by the software with the DMX-SPI converter simply acting as the gateway.

Please note that the first channel to be converted is at the base address thus:

1	2	3	4	5	6	7	8	9
R1	G1	B1	R2	G2	B2	R3	G3	B3

Enhanced DMX (Mode 3)

This is the mode most commonly used and unleashes powerful tools to create visually engaging displays with only a handful of DMX channels.

Please note Channel 1 is the base address, not necessarily DMX channel 1. A blank entry on the table indicates it is ignored. A detailed description of some of the modes appears in the next section.

It is essential that channels 6,7,8 and 9 are set to zero. This is part of the error checking algorithm for noisy DMX environments.

Ch1	Mode	Ch2	Ch3	Ch4	Ch5
0	Enhanced DMX-SPI Conversion (Ch10-)	Number of DMX Channels Decoded			Scale
1	Red	SPI Channels	Brightness		Scale
2	Green	SPI Channels	Brightness		Scale
3	Blue	SPI Channels	Brightness		Scale
4	Magenta	SPI Channels	Brightness		Scale
5	Orange	SPI Channels	Brightness		Scale
6	White	SPI Channels	Brightness		Scale
7	Multicolour chase	SPI Channels		Delay(0=fastest)	Scale
8	Multicolour fade	SPI Channels		Delay(0=fastest)	Scale
9	Multicolour fade slow	SPI Channels		Delay(0=fastest)	Scale
10	Rainbow colour change	SPI Channels		Speed (0=slowest)	Scale
11	RGB Fill (R=ch10 G=Ch11 B=ch12)	SPI Channels			Scale
12	Multicolour shifts	SPI Channels		Speed (0=slowest)	Scale
13	Reserved				
14	Blue/White chase	SPI Channels		Delay(0=fastest)	Scale
15	Blue/White backwards chase	SPI Channels		Delay(0=fastest)	Scale
16	White Meteor	SPI Channels		Delay (0 is fastest)	Scale

Sound Activated Modes (Enhanced DMX Mode 3)

When specified with sound processing hardware the following additional features are available:

Ch1	Mode	Ch2	Ch3	Ch4	Ch5
236	VU Repeated	SPI Channels	Noise Floor		Scale
237	Magic Rain	SPI Channels	Noise Floor		Scale
238	Dream Fade(R=ch10G=ch11 B=ch12)	SPI Channels	Noise Floor		Scale
239	Strobe	SPI Channels			Scale
240	Green/Blue Chase	SPI Channels		Speed (0=slowest)	Scale
241	Red/Blue Chase	SPI Channels		Speed (0=slowest)	Scale
242	Reserved				
243	White/RGB Gradient (R=ch10 G=ch11 B=ch12)	SPI Channels			Scale
244	Flip	SPI Channels	Noise Floor		Scale
245	Fade Out Red Dot	SPI Channels			Scale
246	Chase	SPI Channels	Noise Floor	Speed (0=slowest)	Scale
247	Pulse	SPI Channels	Noise Floor		Scale
248	Fade to White	SPI Channels			Scale
249	Chase2	SPI Channels	Noise Floor	Speed (0=slowest)	
250	Standard VU	SPI Channels	Noise Floor		Scale
251	Double VU	SPI Channels	Noise Floor		Scale
252	Standard VU (alt colours)	SPI Channels	Noise Floor		Scale
253	Peak Hold VU	SPI Channels	Noise Floor		Scale
254	Standard VU2	SPI Channels	Noise Floor		Scale
255	Random Selection	SPI Channels	Noise Floor	Speed (0=slowest)	Scale

Variable Noise Floor

This is a very useful feature for filtering out background noise. Background noise can occur when using poor quality music sources such as highly compressed MP3 files, cassette tapes or vinyl turntables with poorly controlled 'rumble'. Noise can also occur when using the built-in microphone if the unit is located in close proximity to cooling fans or is mounted in a moving vehicle.

To set the noise floor, select standard VU mode and either play a blank track (if using the line input) or switch off the music if using the built-in microphone. Then, increase

the value of DMX channel 3 until the VU meter goes out. The noise floor is now correctly set.

Setting The Master Gain

To set the master gain, select standard VU mode and play a track at normal volume. Using a jeweller's screwdriver or trimmer, adjust the master gain potentiometer until the average response sits approximately halfway up the display.

Note that the maximum gain is achieved when the trimmer is rotated anti-clockwise.

Controlling the SPIP via DMX

Setting The Number of SPI Channels

Channel 2 has to be set to tell the processor how many channels to send out. The formula is as follows:

$$\text{Channel 2} = \frac{\text{Number of DMX Channels} + 10}{2}$$

For instance, 30 RGB fittings = 90 DMX channels, so ch2 $= \frac{90 + 10}{2} = 50.$

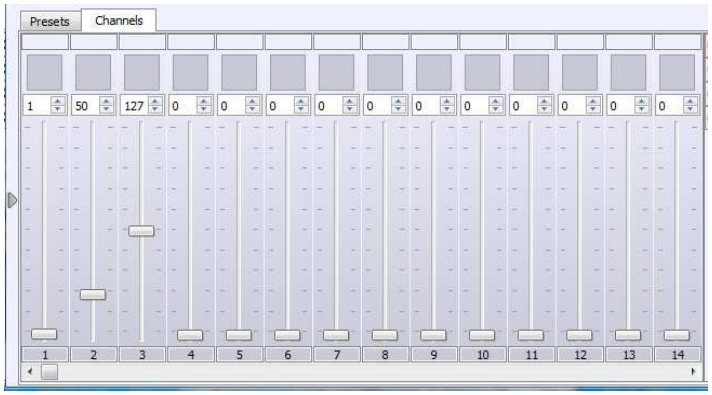
In reality, as long as channel 2 is set to greater than the number of channels it will suffice.

Examples of DMX Programming

In the following examples, the base address is set to 1 (default) and we're feeding the unit from a Chromateq LP512 DMX Player, although any programmable DMX controller will suffice.

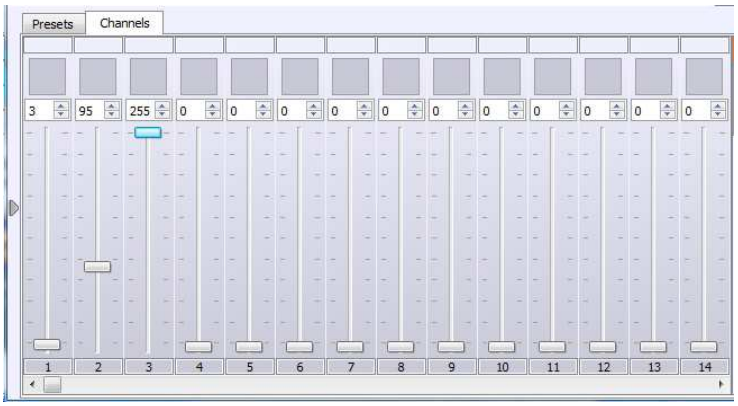
Example 1: A Dream LED striplight with 30 RGB zones is set to red at 50% brightness. The red mode is 1, the number of SPI channels is 30 x 3 + 10 = 100. This is because each RGB zone requires 3 channels, and there are 10 control channels. As this slider is internally scaled by 2, the slider is set to 100/2 = 50.

Slider 3 is simply the brightness, 0 = off, 255= maximum. 50% brightness is 127.



To recap, channel 1 sets the mode to 1 (red), channel 2 sets the number of RGB fixtures and channel 3 sets the brightness. Channels 6 to 9 must be set to zero, none of the other channels have any effect.

Example 2: 60 LED RGB Downlights are to be set to maximum blue



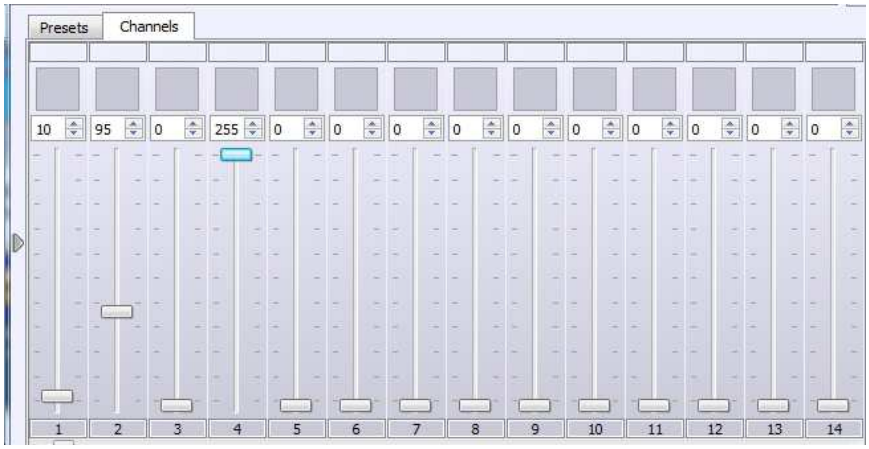
Firstly, set the mode to blue by setting channel 1 to 3. As there are 60 RGB fittings the number of SPI channels is ((60x3)+10)/2) = 95.

Then, it's simply a case of setting the brightness to maximum (255).

Example 3: 60 LED RGB Downlights are to be set to rainbow colour change

Firstly, set the mode to rainbow colour change by setting channel 1 to 10.

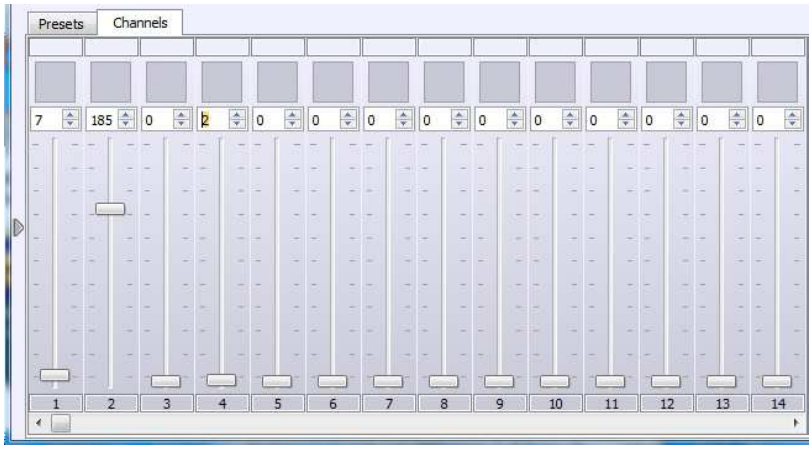
As there are 60 RGB fittings the number of SPI channels is ((60x3)+10)/2) = 95. The speed is set by channel 4, with 255 being the fastest.



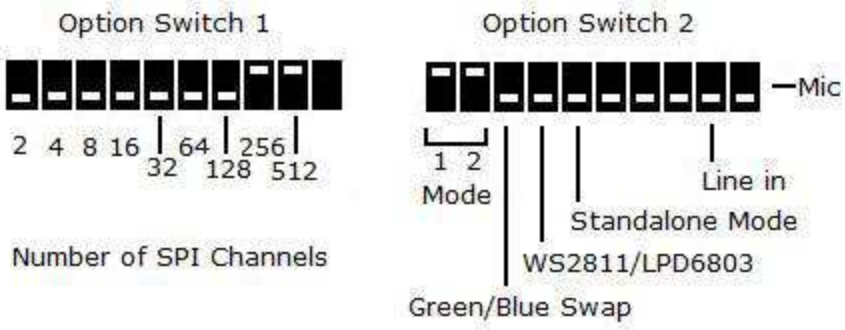
Example 4: 120 LED RGB Dream Striplight is to be set to multicolour chase pattern

Firstly, set the mode to multicolour chanse by setting channel 1 to 7.

As there are 120 RGB LEDs the number of SPI channels is ((120x3)+10)/2) = 95.
The speed is set by channel 4, with 0 being the fastest.



Stand Alone Modes



Where there is no DMX controller available there are a number of built-in routines available. It is important to set the number of SPI channels on option switch 2. The modes are as follows:

Mode	Effect
0	Smooth Chasing, pulse and VU effects
1	Chasing effects
2	Chasing and VU including strobe
3	Slow multicolour chases

Comparison Between LPD6803 and WS2811

We are frequently asked which protocol to choose, here is a basic summary of the two types:

LPD6803

Usually fed by a 12v signal
Requires CLOCK and DATA lines, +12 and 0v.
In flexible strip configuration, LEDs are usually grouped in threes
Supports both constant voltage and constant current drive mode
3 channel driver output, maximum current per channel is 45mA

WS2801

Usually fed by a 5v signal
Requires only a DATA line, +5 and 0v.
In flexible strip configuration, LEDs are usually grouped in threes
Supports both constant voltage and constant current drive mode
3 channel driver output, maximum current per channel is 150mA
PWM refresh rate 2.5KHz

Not Quite What You're Looking For?

At LED Lighting Products we understand that each user's requirement is different. If you have specific requirements, our software engineer can discuss this with you. Please contact richard@ledlightingproducts.co.uk with details of your specific requirements.

Warranty

12 months unconditional from date of purchase. For product support, please contact info@ledlightingproducts.co.uk

Product Disposal

When you eventually decide to update or upgrade this product, do not dispose of it with your normal household waste or at a local amenity tip. You should either take it to a recycling centre or return it to the retailer from which you bought it where they will arrange for it to be recycled.