LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

About the LED-PLAYER-M

The control of digital LED strips or LED matrices is no longer a problem now. Even different protocols, settings, different lengths and matrix sizes are for the LED-M-Player a breeze.

The LED Player can control and manage up to 2048 digital PWM LEDs comfortable and easily. Equipped with eight channels, small and even larger projects for party lights, video board or professional lighting installations are implemented quickly and professionally.

Live video on a panel surface are possible as stored sequences, cues or effect installations for small and large lighting performances.

Applications such lavish party lighting, home theater installations, pool lighting, garden and house lighting, propelled shops or sophisticated LED-Lightning solutions for indoor or outdoor use – are no longer a problem.

With the LED-M Player imagination has lost its limits.

The module is small, compact and highly configurable. The control options are noteworthy. Via USB Windows pads or notebooks and PC can be used as a player. Free software like JINX! or gLEDiator are optimally suited for home and professional applications use. These sequences can be as well as a file on a simple micro SD card to store and insert it into the LED-Player-M, the module becomes a stand-alone light jockey.

In short a real power dwarf equipped with the latest Cortex-M4 microcontroller technology, a real challenge for professionals and amateurs alike, which get along with a variety of matrices and stripes and via online firmware update also useable for future applications.
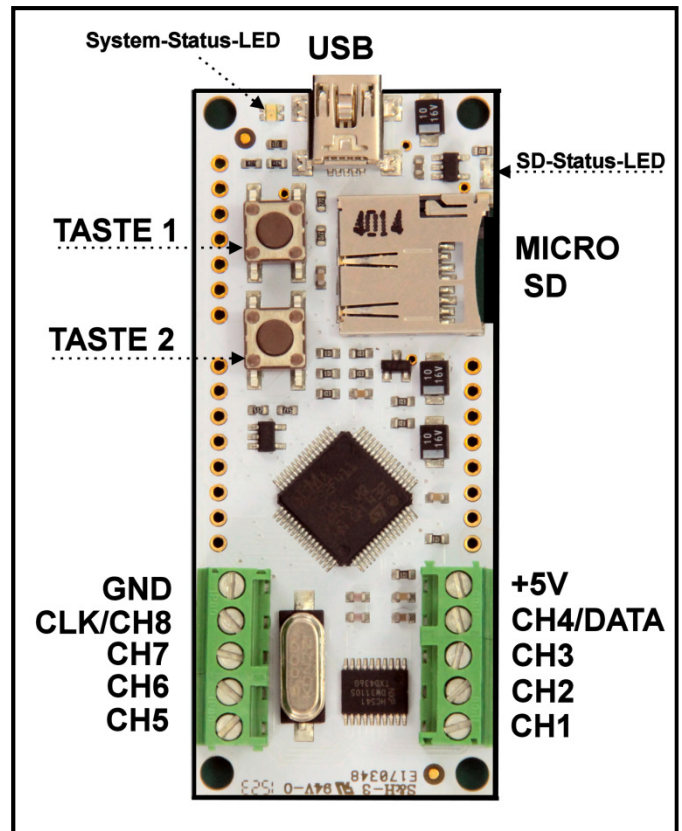
LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

Features

• LED player M plays LED data in TPM2 format directly from the SD card.

• LED panel programs like JINX or GLEDIATOR can send their data directly to the LED-Player-M via the USB port.

• Maximum capacity 2048 LEDs.

• Various LED protocols are supported, both for LEDs with only one asynchronous data pipe (Single Wire) as well as LEDs with synchronous data and clock lines (Dual Wire).

• LEDs, Stripes, panels of the following types are supported:

• WS2811 / 12 (compatible UCS1903, PL9823), APA106, WS2821 (DMX), WS2801, APA102, LPD8803 / 06th

• Mini USB 2.0 port for virtual COM port (Player for JINX, GLEDIATOR etc.), virtual PC drive (access to the SD card), configuration and updates via bootloader.

• 2 keys for flow control.

• Screw terminals for LED data outputs and power supply.

• Fully configurable via Tool:

• Protocol for PC data, LED protocol, number of connected stripes or panels, arrangement of colors in the data stream, length of stripes, size of panels and arrangement of the LEDs on the panels, reflections, timing parameters of the protocols.

• Micro-SD card slot for playing back files in TPM2 format without a PC. SD card can be read as a virtual drive directly from the PC and described.

• Status LEDs for system and SD card.

Software - Installation

Download the software package for the LED-player M (see links)

LED-PLAYER-M

Manual, Connections, Power supply, Configuration, Software

The LED-player M can play directly TPM2- and GLEDIATOR data from the PC. To this end, a virtual COM port is established via USB. In order that your PC recognizes the player LED-M, the INF driver file is required, which is located in software package for LED-Player-M. Please select through the Windows Device manager the function "software update" and then select the "LED-player m.inf" file from the directory of the software package (default can be found at "C: \ Program Files \ Led player M "). In Windows 8, 8.1 or Windows 10, you may need to "disable Driver Signature Enforcement under Windows xx". How this works can be found online if you search for "Driver Signing Windows 8".

Programs like JINX or GLEDIATOR TPM2- or GLEDIATOR can output data directly to the virtual USB COM port. The baud rate is ignored; USB automatically uses the maximum possible speed.

The configuration tool is installed on the desktop of your PC during installation of the software package. By double-clicking on the icon the tool will be started.

LED-PLAYER-M

Manual, Connections, Power supply, Configuration, Software

Connections of Stripes and Panels

There are generally two different types of "smart" LEDs: LEDs with only one data line (Single Wire, for example, WS2811 / 12, APA106, WS2821), here the timing of the LED manufacturers is set and must be strictly adhered to within certain limits. The second option are the LEDs that require two lines (Dual Wire, as WS2801, APA102, LPD8803 / 6), a data (DATA) and a clock line (CLOCK). The timing here is relatively uncritical because the data are transferred synchronized with the clock.

All LED types have a common function that they possess input and output signals. The LEDs can be easily connected in series by the outputs of the first LED and can be connected to the inputs of the next LED (daisy chain principle). The names of the LEDs vary among manufacturers but usually these are DI for data-in, data-out for DO, CI for Clock-In and CO for Clock-Out.

**Anschluss von Stripes/Panels
WS2811/12, WS2821, APA106**
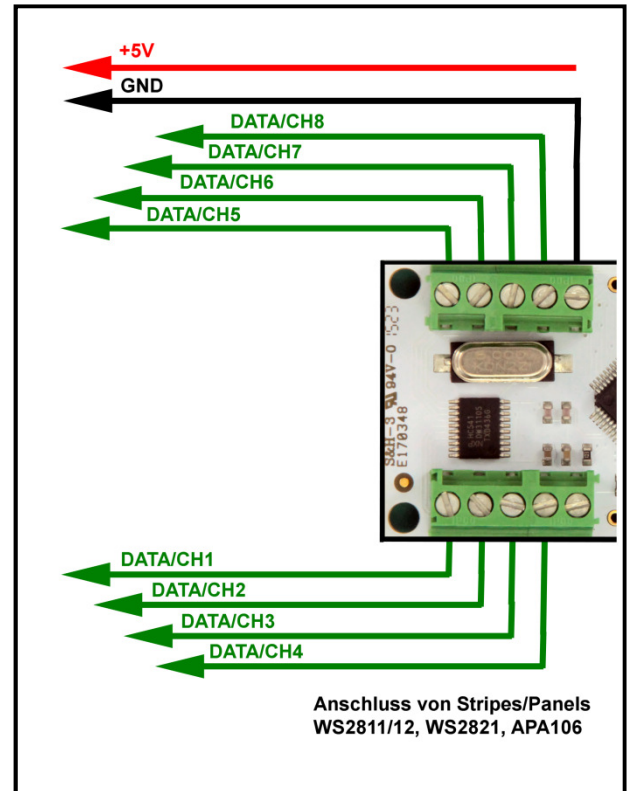
Connection of LEDs, Stripes, panels with a data line:

Connect the data lines always beginning at channel 1 (CH1). The number of connected LEDs per channel should always be the same so that a seamless transition is ensured by one to the next channel. The use of the number of channels and of the number of LEDs can be defined with the configuration tool. The maximum number of connected LEDs per channel is 1024.

Example: On the channels CH1 and CH2 a stripe with 64 LEDs is connected in each case. The data on the SD card are designed for 128 LEDs. The data read from the SD card will now be allocated to the Stripes as follows: The data for LED 1 to 64 are CH1 and the data for LED 65-128 are output via CH2. In the configuration tool in the stripe setting 2 used channels, each with 64 LEDs can be adjusted.

**Anschluss von Stripes/Panels
WS2801, APA102, LPD8803/6**
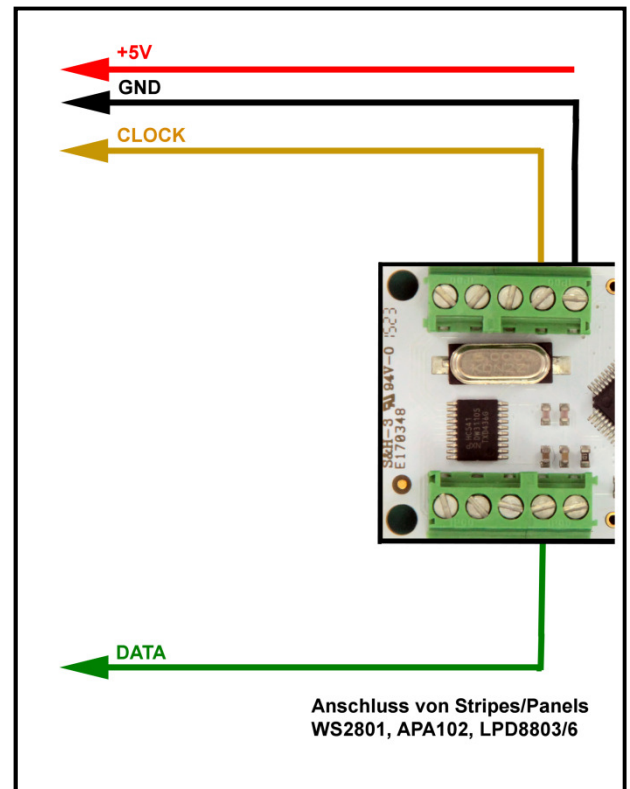
LED-PLAYER-M

Manual, Connections, Power supply, Configuration, Software

Connection of LEDs, Stripes, panels with data and clock line:

For technological reasons for this LED-type only one channel is available. Due to the much higher bit rate, however, up to 2048 LEDs can be connected in a row here. DATA (DI) is connected to CH4 and CLOCK (CI) to CH8, the remaining ports remain.

Please refer to the following chapters concerning the various ports of the power supply of LEDs.
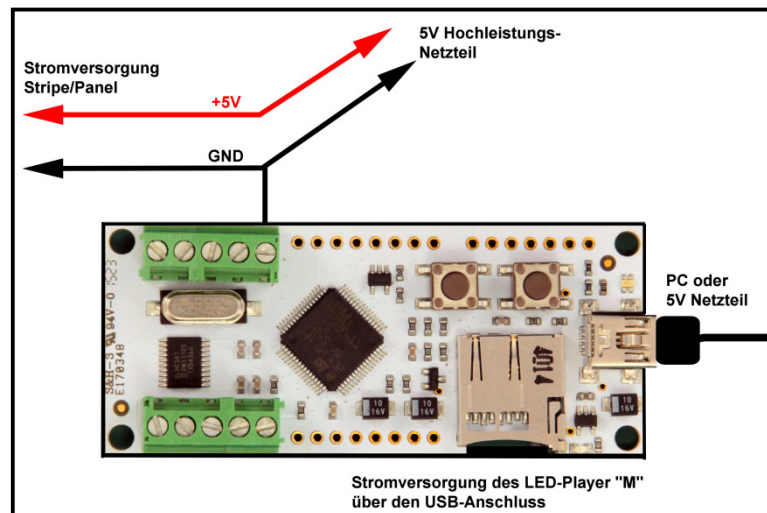
Power Supply

Single LEDs require only a small current. This can, however, add up to impressive values in long stripes or large panels. As an example, the current consumption of a WS2812 LED serves. At 100% the white LED 60mA requires 5Volt. It seems not to be very much but at 10 LEDs we already have 600mA. A normal USB 2.0 port is already overloaded because it can usually provide a maximum of 500mA (according to USB specification). For this reason, we always recommend the use of a power supply according designed for the required LEDs.

### Version 1: Supply of the LED player via USB port

This variant is always required when you play data from JINX or GLEDIATOR via USB directly or if you want to access the SD card in PC mode or want to change the configuration.

The LED player is supplied with power via the USB port. This may be a connected PC or even a 5 volt power supply.

Version 2: Supply of the LED player via AC adapter

In this variant the LED player may not be connected to the USB port of the PC. Here it is only used for playing back files from the SD card (standalone).
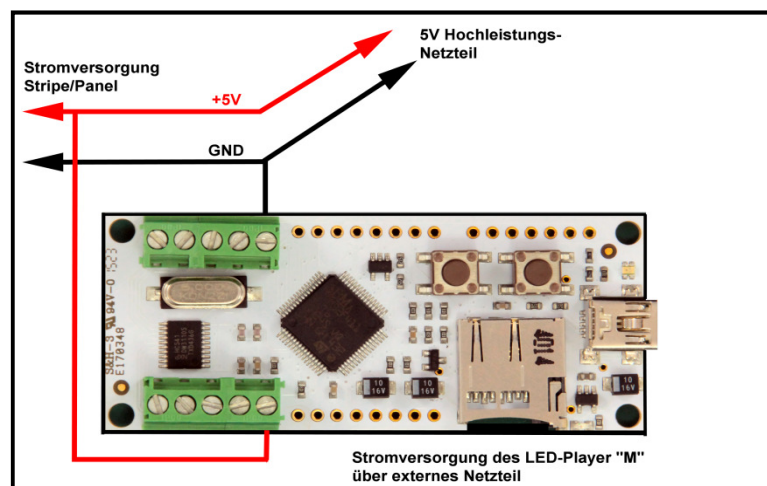
LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

The + 5V line of the PSU is connected to the + 5V terminal of the LED-player in order to supply it with power.

IMPORTANT INSTRUCTIONS

Never connect both power supplies at the same time. Either use power supply via USB or power supply via the terminal block.

Concerning LEDs which require a higher voltage to operate please always choose variant 1. Never connect a voltage higher than 5 volts to the LED-player M.

Please pay attention to the polarity of the power supply. Reverse polarity will result in immediate destruction of the LED-Player and connected LEDs.

Buttons

The two buttons on the LED-Player-M have different functions depending on the mode.

Sleep Mode (LED flashes slowly yellow) - Playing LED data from the PC (LED flashes blue):
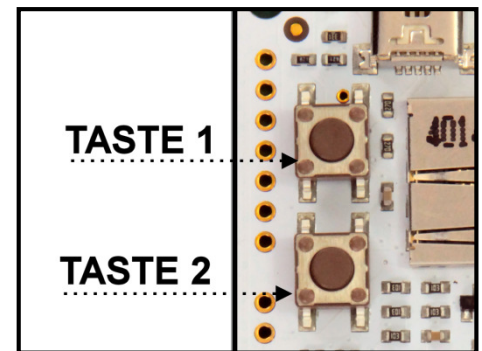
Button 1	No function
Button 2	A longer press (2000ms Standard, adjustable via the configuration tool) starts the boot loader where an update of Bios is possible

SD card inserted:

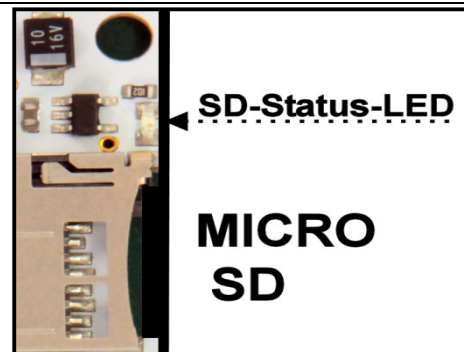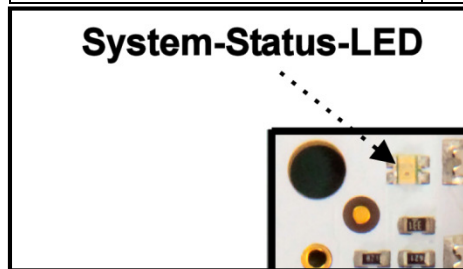| **Button 1**	Press button briefly: The current file will be started or repeated. Press and hold (1000ms Standard, adjustable via the configuration tool) starts the PC-drive mode. The playback is stopped and the SD card can now be read and written via the PC. This mode is left when the SD card is removed or button 1 is pressed briefly. Please observe the notes in the chapter "SD card"!
Button 2	Press button 2 briefly: The next file is started. After the last file, the first file will be selected again. A long press (2000ms Standard, adjustable via the configuration tool) starts the boot loader where an update of Bios is possible

LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

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LEDs

When applying the power supply and plugging in the USB connector, a self-test is performed. The system status LED flashes white for about 500ms and the SD-Status LED is red. After that both LEDs are switched off and show the following status.

System status LED (RGB):

Yellow flashes slowly	sleep mode active - no player function
Red flashes rapidly	bootloader mode is automatically left after 10 seconds
Green flashes rapidly	file on the SD card is waiting for the start button to be pressed
Blue flickers	Player active, data is read from the SD card or via USB received and sent to the LEDs.
Red / Green flashes alternately	PC disk mode is enabled. The SD card can be read or written from the PC.

SD-status LED (red):

| Off	No SD card is insert
On	SD card is ok. Data can be read
Flashes 2x	SD cannot be read. SD card may not be suitable, only SD and SDHC up to 32GB are allowed, SDXC cannot be read.
Flashes 3x	No supported file system on the SD card. Card must be formatted in FAT16 or FAT32, NTFS or Linux file formats cannot be read. No TPM2 file found.
Flashes 4x	Content of the configuration file _CONFIG_ is faulty.
Flashed quickly	A defined file which is in the configuration file, does not exist or cannot be read.

LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

SD card

LED-player M can play TPM2 files from an inserted micro SD card.
For this some requirements must be met:

There are 2 different ways in which files can be played via a
configuration file or by simply copying the files to TPM2 the SD
card.
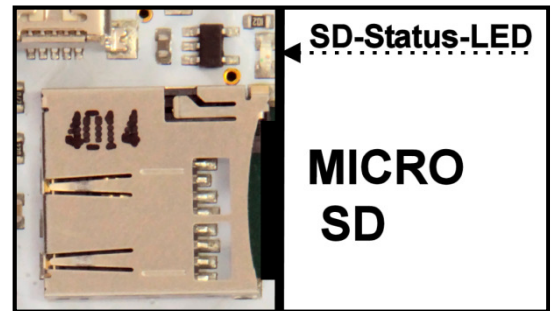
Advantages by using the configuration file:

• The order of the files to be played can be better controlled.

• Files can be executed multiple times or infinitely.

• The playback speed can be changed.

• The brightness factor can be changed.

• Start by pressing a key can be set.

Disadvantage by using the configuration file:

• The file must be created and edited with a text editor (alternatively with the program LedEddy),
precise format rules must be respected.

Filename

All file names must be constructed in 8.3 DOS format, long filenames of Windows or Linux are not
supported. The configuration file must be named _CONFIG_. If the configuration file is used all names
of the data files can be defined in this. If the configuration file is not used all data files must be played
on the SD card have the extension .TP2 for example EFFEKT10.TP2. All files must be in the root
directory of the SD card, subdirectories are not supported even if they are specified in the
configuration file.

Order of the files to be played

If the configuration file is used, the order of the files to be played is automatically set in this. The
structure of the configuration file will be described below.

LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

Without configuration files when inserting the SD card it will be searched for all * .TP2 in the root directory of the SD card. These are shown in alphabetical order in succession. By giving a name the order of the files to be played can be specified.

For example, the following files are on the SD card:

A1.TP2
A2.TP2
A10.TP2
Here A1.TP2 is played first, after A10.TP2, last A2.TP2, as this corresponds to the normal sorting algorithm. It is better to replenish always numeric enumerations with zeros, while the order is always clear.

A01.TP2
A02.TP2
A10.TP2

All files are generally performed only once with 100% brightness and 25 frames per second. After that it will be changed without pressing a button to the next file. With button 2 it is possible to change can prematurely to the next file and with button 1 the current playing file can be started from the beginning again.

LED-PLAYER-M

Manual, Connections, Power supply, Configuration, Software

Which SD cards are suited?

While developing the LED-Player-M many micro SD cards from different manufacturers were tested. Most performed without any problems. Please note that only cards with the following conditions can be read:

• SD or SDHC cards
• A maximum of 32GB capacity
• File Format FAT16 or FAT32

Not suitable are SDXC cards. Card with other file formats (NTFS, Linux formats). Please first reformat from FAT16 to FAT32 reformat with the PC. (Attention! All data will be cancelled).

Read error of the SD card

If the inserted SD card is not recognized by the LED-Player-M or defective data are contained, will this be indicated by flashing of the SD-status LED. What singular flashing rhythm means can be read in the section "LEDs".

PC Mode: read and write SD card to the PC

The inserted SD card can be read or written directly to the PC. Here for please press button 1 for 1 second (default, can be changed via the configuration tool) until the system status LED flashes red / green. Now it can be accessed via the file manager of the PC on the contents of the SD card. The PC mode will be left by removing the SD card from the LED-Player-M or if button 1 is pressed briefly. Important! To avoid errors in the file system the SD card should always be removed by the function "Safely Remove Hardware and Eject Media" before the PC mode will be left.

They SD card can also be written you externally with a card reader connected to the PC. If you want to transfer larger files to the SD card or format the SD card this option is preferable as the transfer rate for LED-Player-M is relatively slow.

LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

Structure of the configuration file on the SD card

The file must always be named _CONFIG_ hot (underscore CONFIG underscore) and should be situated in the main directory (root) of the SD card. The configuration file is first scanned and analyzed when the SD card is inserted. You can create and edit the file with a normal text editor.

Valid lines in the configuration file

autostart = 0
After reading the configuration file the LED player waits for a button to be pressed. Only then the first file is output.
autostart = 1
After reading the configuration file the playback of the first file will be started immediately, there is no need to push any button.

File configuration (spaces are only inserted for readability they are ignored by the LED-Player).

[a]   [b]   [c]   [d] [e] [f]

file_xx = ABCDEFGH.TP2, 25, 1, 0, 100

a) Index for a file entry. xx is a two-digit number. The order of the files being played does not depend on this point, but only on the order of the file entries in the configuration file. Active files always begin with the string "file_xx". Files which should not be reproduced start with "_file_", these are ignored by the LED player.

b) Name of the file. Here it is important to respect the 8:3 formats. Long filenames will not be processed. The extension * .TP2 and * .OUT are only accepted

c) The rate of output in frames / second. The default value is 25. Valid values are 1-50. Note that it may eventually come to flickering of the LEDs at a high frame rate if a lot of LEDs must be driven (data overflow).

d) How often should the file be played (loops)? The default value is 1.valid values are 1-255, 0 means infinite repetition. You can switch to the next file only by pressing button 2.

e) Identification of stopping at the end of the file. The default value is 0, no stop. Valid values are 0 or. 1

f) Playback brightness in percent. Default is 100. Valid values are 0-200. Increasing the brightness of up to 200% is thus possible but be careful that this may fine gradations are falsified.

LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

Playback of data on the PC-LED

LED-Player-M is perfectly suited for playing back data from the programs JINX or GLEDIATOR (Sources: See links) which are supplied. LED-player-M can handle the protocols and TPM2 GLEDIATOR, process them and transmit to the connected LEDs, stripes or sanels.

Both programs are very extensive and for the novice difficult to operate. For the program JINX which we prefer here in the manual, a good English-language instruction for configuration exists (see links).

To play data on the PC the LED-Player-M must be in sleep mode - the system status LED will flash yellow slowly. A SD card may not be inserted. If the driver for the virtual COM port is installed and JINX is not configured correctly should the readout of the data to the LEDS start after activating the menu item "START OUTPUT" in JINX. A blue flicker of the system status LED indicates that data is being received. Anyway if no lights flash please go again to the guidance by JINX. Often the cause is a misconfiguration of the "Output Patch".

As the LED-Player-M manages the color arrangement and the arrangement of the panels themselves, should the settings in the JINX menu > "Output patch - fast patch" set the default values as follows:

Patch Mode: line wise starting top left
Pixel Order: RGB
A configuration which deviates from your hardware of this data, please set all this data directly in the LED-Player-M through the configuration tool.
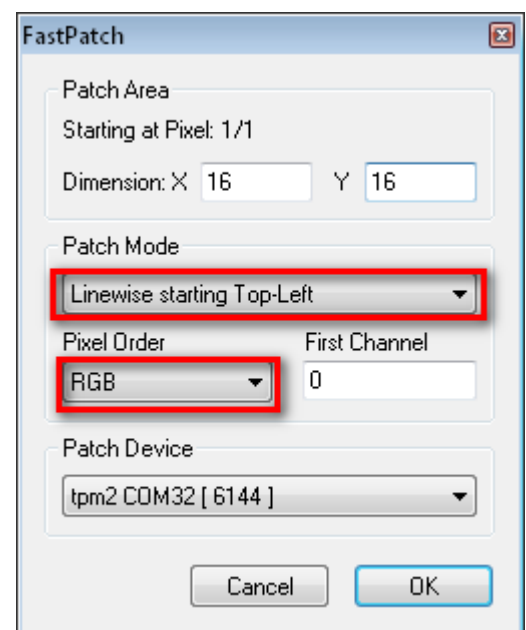
LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

What's TPM 2?

TPM is an abbreviation for "Transport Protocol for matrices", a popular data protocol for the control of LED panels. Many programs support this freely available protocol now, such as JINX or GLEDIATOR. However, it has not to be a LED panel. This protocol is ideal also for one-dimensional LED-Stripes. The data transfer from the PC to LED player via the USB interface at the maximum speed, so a rate of 25 frames per second is achieved and thus a flicker issue is guaranteed.

Building a TPM2 file

A frame consists of a header (4 bytes), the LED data (3 bytes per LED) and footer (1 byte). Several frames can be easily filled consecutively and played. As a rate 25 frames per second are standard provided in the LED Player M, this rate can be changed via the configuration file and adjusted in limits on their desires.

Frame header	C9 DA HH LL	HH LL LL = number of the following data bytes
LED data	RR GG BB	3 bytes per LEDF
Frame Footer	36	

What happens if the number of connected LEDs does not match the number in the TPM2 file?

If more data are in the file TPM2 only the existing LEDs are driven and the rest of the data will be discarded. If fewer data are available only the defined numbers of LEDs are controlled. All other LEDs stay dark.

And GLEDIATOR protocol?

This very simple protocol is accepted by the LED-Player-M via a USB connection and can be played back (setting in the configuration tool). But in construction of the data format no length of the data frame is present so that the number of set LEDs must exactly match the number set in the data. Files with GLEDIATOR protocol cannot be used on the SD card.

LED-PLAYER-M

Manual, Connections, Power supply, Configuration, Software

Project: 8 panels with 16 x 16 pixels result in a large panel with 64 x 32 pixels

We want to put together a great show from a total of 2048 Panel LEDs. For this purpose we first get us 8 DigiDot panels, each 16x16 LEDs of the type of WS2812 www.led-genial.de (see link).

Starting from the input port, the arrangement of the LEDs on this panel is as follows:

LED1 (Start LED) is on the bottom left (Bottom Left).

The LEDs are arranged in columns and in so-called serpentine (Snake Columns). The output connector is not required for our project - all 8 panels are connected directly to a channel of the LED-Player-M.

Anordnung: Snake Columns

GND
Input
+5V

1. LED
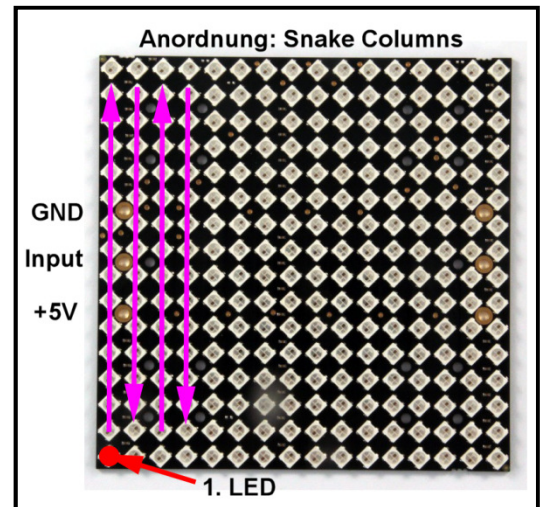
Construction

Now everything is wired as the following drawing. Particular attention is here to be observed in the power supply. Supplying 2048 LEDs requires a lot of discipline in the selection of the power supply and the connecting lines for the power supply:

• Keep all cables from the power supply to the panels as short as possible.
• Supplying the panel from both sides with power.
• Cable thickness 4mm ² or more.
• Power supply at least 60 amps at 5 volts.
The DigiDot panels can of course be strung together seamlessly.

V1,
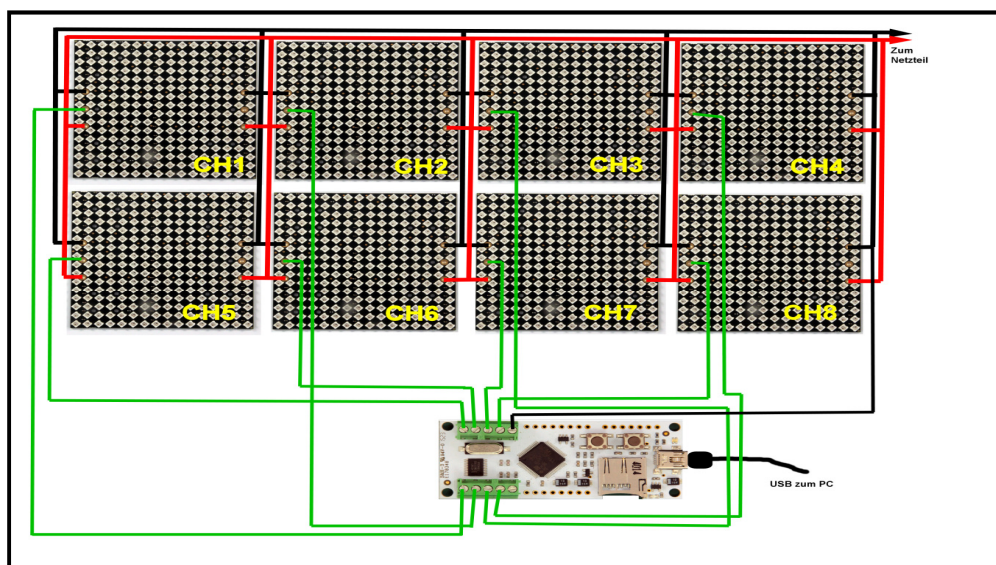
LED-PLAYER-M

Manual, Connections, Power supply, Configuration, Software
Activation

As the large panel should initially be driven by JINX via the PC, we supply the LED-Player-M only over
the USB cable. In JINX a matrix of 64 x 32 pixels is defined and fully patched to the COM port of the
LED player in the Output Patch with the default values and RGB "linewise starting Top-Left". In the
configuration tool for the LED-Player-M, we set the following matrix configuration:
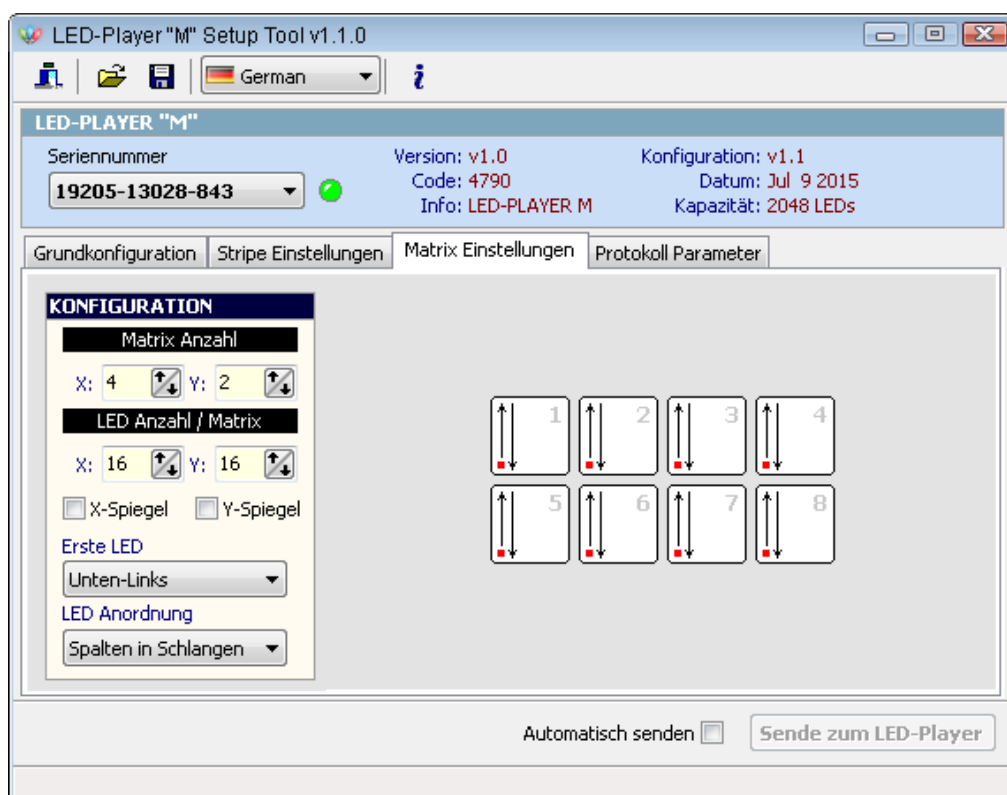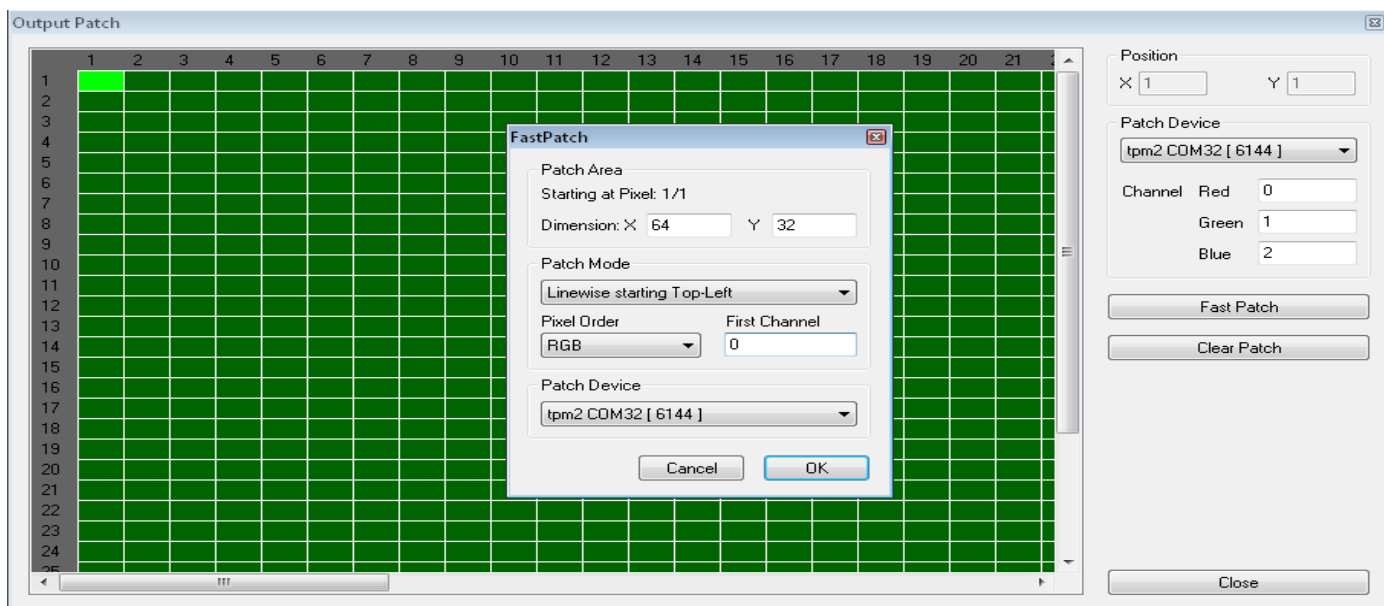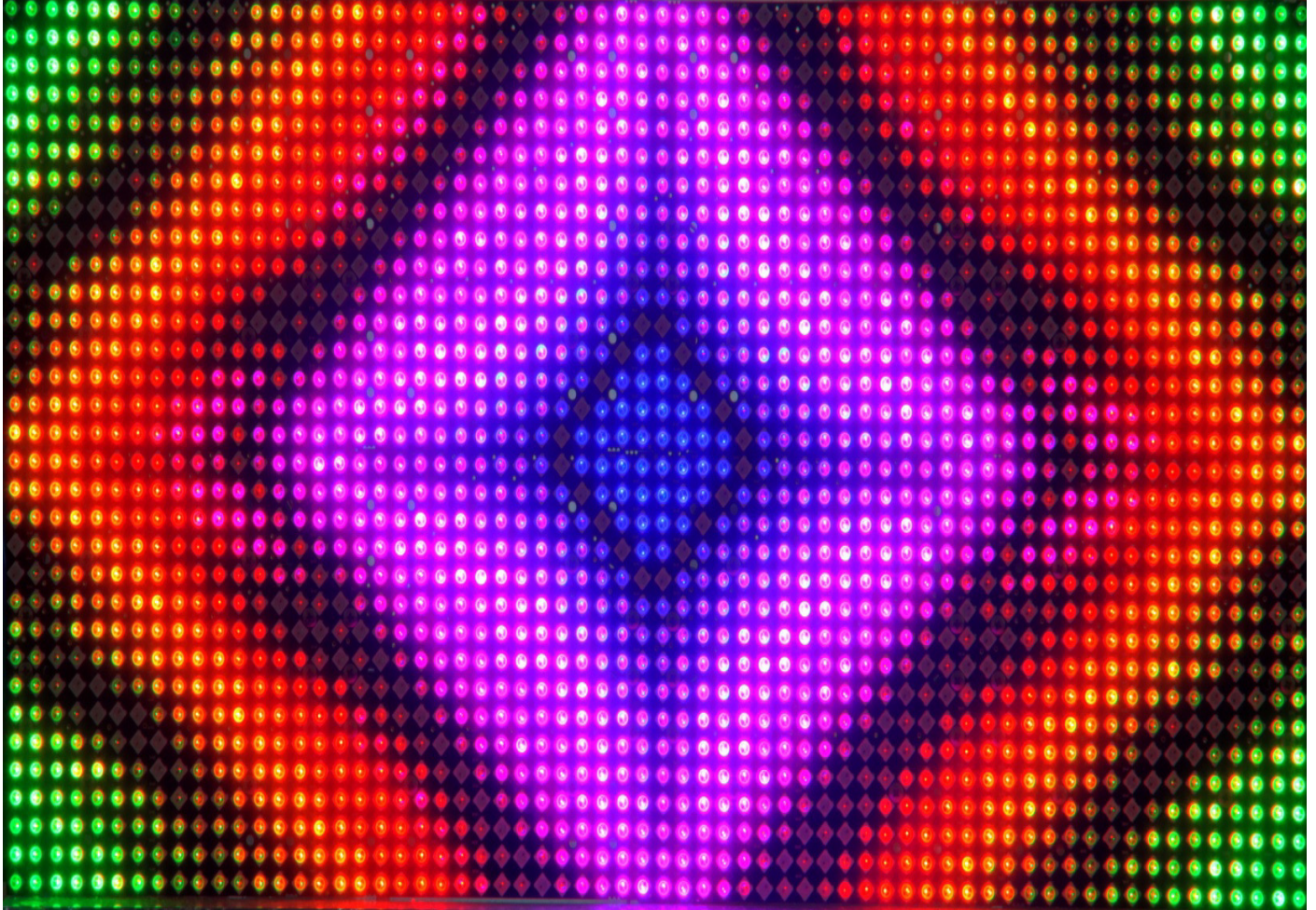
LED-PLAYER-M

<u>Manual, Connections, Power supply, Configuration, Software</u>

The result of our project is fascinating to watch. The luminosity of a panel installation is breathtaking. A picture cannot impossibly reflect the fascination of the original panel.

The data generated by JINX can also be written to the SD card and play from there without connection to a PC. In this case the LED-Player-M must of course be supplied from the external power adapter (see chapter power supply).
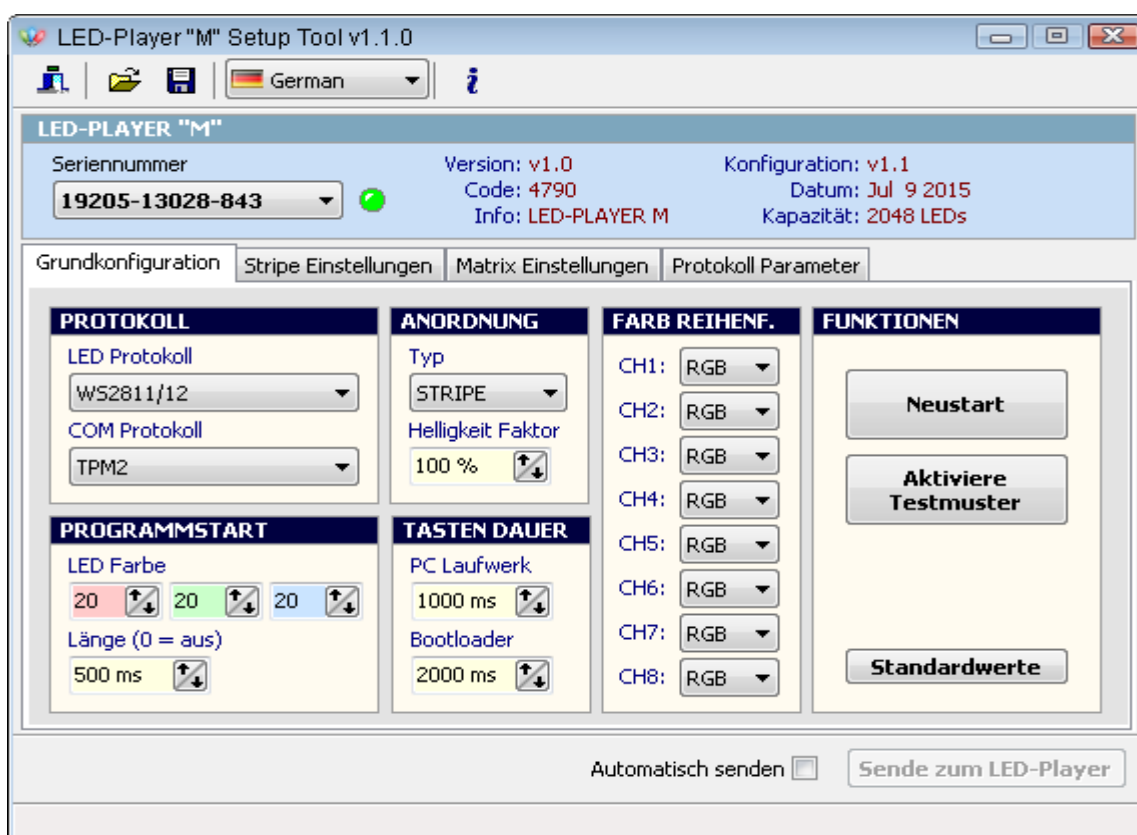

LED-PLAYER-M

Manual, Connections, Power supply, Configuration, Software

Configuration Tool

Start the LED-Player-M configuration tool by double clicking on the desktop icon.

The interface is available in German and English. Please choose your preferred language.

When a LED-Player-M has been found on a USB port it will be immediately identified and read all parameters data. This works even if files are played from an SD card or reproduced by the PC. Changes in the configuration can be made as well while operating so changes are immediately visible. In emergency the settings can be reset to the default in case values are set at wrong places and the LED-M-Player no longer does what it should.

LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

Basic function

PROTOCOL

LED protocol	Here you can select the protocol of your connected LEDs
COM protocol	Choose the communication protocol via USB

START OF THE PROGRAMM

LED color	at the start of the LED-Player-M a self-test is performed. All LEDs are lit in the color selected here on
Length	The time in milliseconds how long the self-test is to be performed. Length 0 means that LEDs do not light up during the self-test

ASSEMBLY

Type	Please set here if the stripes or panels (matrix) are connected to the player.
Brightness factor	All LED-information of USB or SD card will be charged with this factor. In order to reduce the power consumption a value under 100% can be chosen - to light dark data a value of over 100% can be chosen

KEYS DURATION

|	
PC drive	The duration in milliseconds how long button 1 must be pressed until the PC mode is enabled.
Bootloader	The duration in milliseconds how long button 2 must be pressed until the bootloader is launched.

COLOR ORDER

Set here the order of the RGB data for the connected LEDs separated for each channel.
Example: WS2812 LEDs typically require the GRB setting because red and green are reversed.

Functions

Restart	A resetting of the LED player is performed. All parameters are read again from the configuration memory and an inserted SD card is searched again.

Activate test samples — The length of stripes and the array of LEDs in panels can be checked with this function. The first LED in the stripe or the LED on the top left of the panel should be green. The last LED in the LED stripe or lower right of the panel must be lit red. For panels the left side must be blue and the right side should be illuminated completely yellow. All remaining LEDs shine white. To cancel the test sample press the "restart" button.
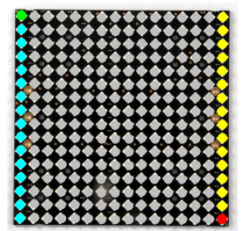
Defaults — All parameters are reset to factory settings after confirmation.

LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

Send to LED player

> If you have made changes in the settings they are sent by clicking on this button to LED-Player-M.

Send Automatically

> If you enable this feature modified parameters are automatically sent to LED-Player-M after 10 seconds.

Save and load profiles

> With the help of these two buttons you can save preset profiles on your hard drive and reload again when required.
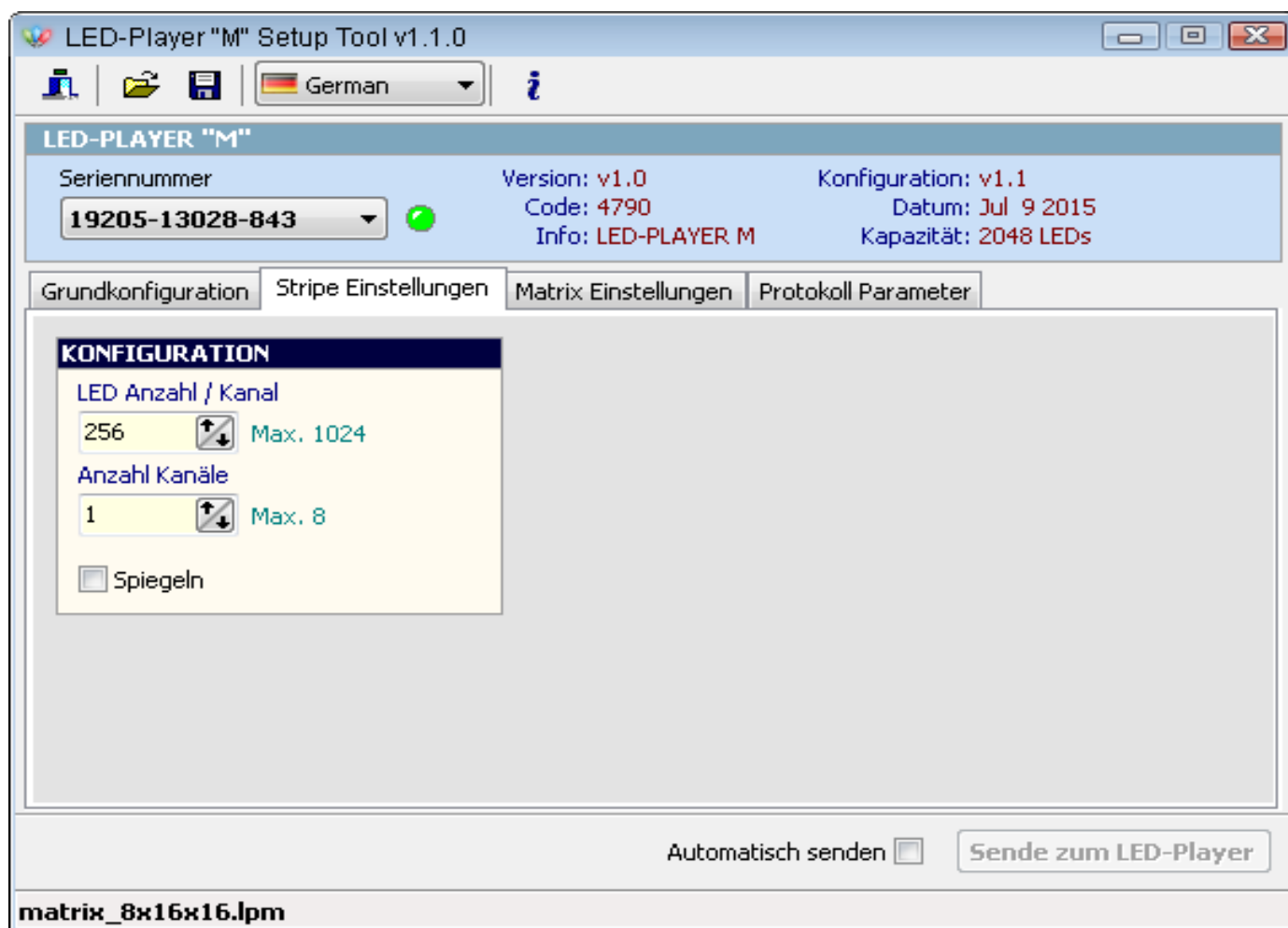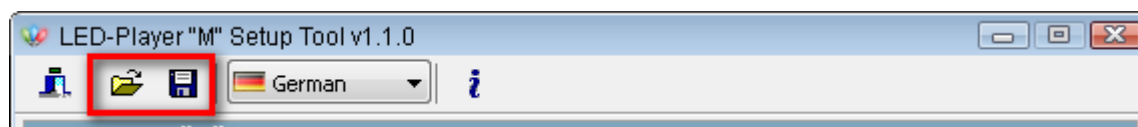
LED-PLAYER-M

Manual, Connections, Power supply, Configuration, Software

Stripe Settings

CONFIGURATION

|	
LED Number / Channel	Here you can select how many LEDs stripe arrangements are connected to the channel output of the LED-Player-M. The maximum number depends on the type of LED and LED protocol used. Please make sure that on all channels the same number of LEDs is connected.
Number of channels	Number of used channels. The maximum number depends on the type of LED and LED protocol used.
Mirrors	Beginning and end of the Stripes are swapped.
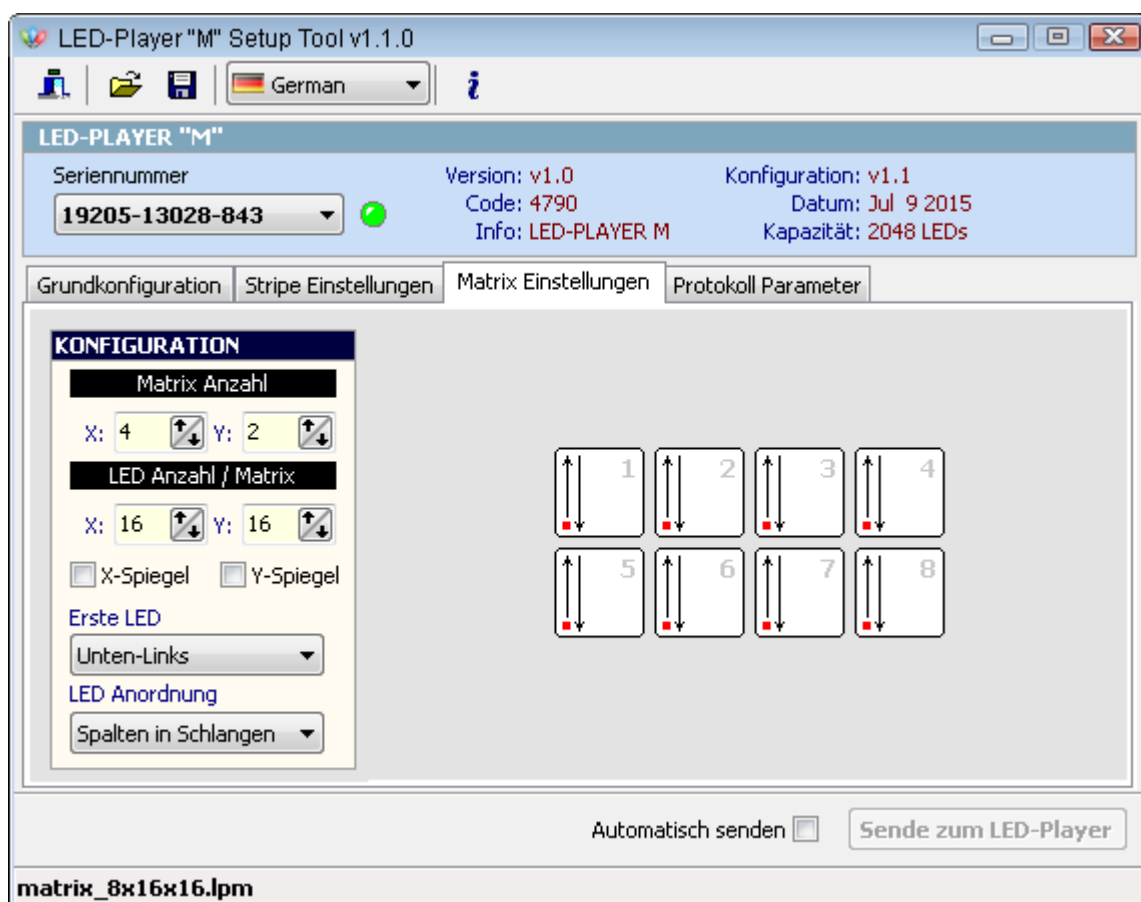
LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

Panel / Matrix settings

CONFIGURATION

Matrix Number	Set here how many panels in X and Y direction are connected to your LEDs-Player-M. The arrangement and numbering of the panels is shown graphically in the right part.
LED Number / Matrix	Number of LEDs per panel in the X and Y directions. All panels must have the same number of LEDs.
X-Mirror / Y mirror	The entire display is mirrored horizontally or vertically. If X and Y mirroring used simultaneously the display is upside down.
First LED	The position of the first LED on the panel. The LED whose data-in signal is directly connected to the input of the panel.
LED arrangement	Set here how, starting the following LEDs are connected on the panel of the first LED.

matrix_8x16x16.lpm
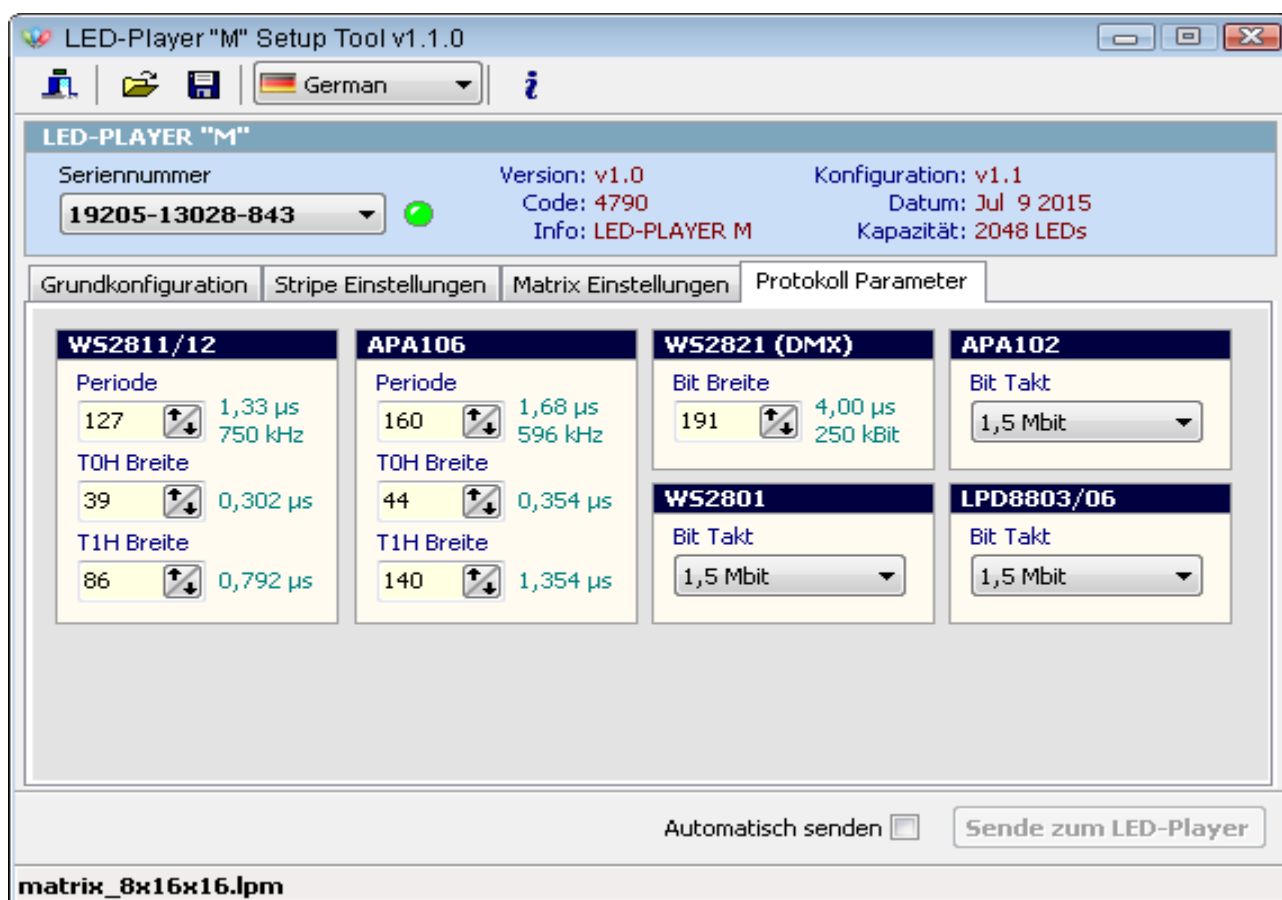
LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

Protocol parameters

Set here the timing values for each LED protocol separately. Change the preset values only if you know exactly what they need to do. Incorrect field values can cause that no more data is sent to the LEDs or the LEDs are driven with data outside the specifications. All parameters can be reset to the default values in the basic configuration.

Example:
Occasional flickering of some WS2812 LEDs. This can happen due to long data lines and crosstalk between the data lines when the LEDs are operated in the exact specification of 800kHz (1,25µs). In this case please set the period-width higher (see above) and reduce the eventual T0H width. Thus the interferences should be eliminated. The LEDs still work properly with these settings.

Note:
A reduction of the period or the bit clock is normally possible, which means that the failure proneness increases.

LED-PLAYER-M
Manual, Connections, Power supply, Configuration, Software

Technical specifications

Current consumption (5V): 20mA when inactive, about 50-60mA when playing a file from the SD card.
Output level: 5V
Maximum capacity of 2048 LEDs
A maximum of 8 channels (with single Wire LEDs), 1 channel (with Dual Wire LEDs)
ARM Cortex-M4 microcontroller with 96 MHz clock frequency

Legal Notice

Liability notice

The manufacturer assumes no liability for damages that may result from the application of LED-PLAYER-M.

Links

Project Forum and Blog for news and knowledge around the LED-Player-M
http://www.ledswork.de

Software package with driver and configuration tool for the LED player "M"
http://www.led-genial.de/mediafiles//Sonstiges/LedPlayerM.exe

LedEddy - Editor for LED Player files
http://www.led-genial.de/mediafiles//Sonstiges/LedEddy.zip
http://www.led-genial.de/mediafiles//Sonstiges/LedEddy.pdf

JINX - LED Matrix Control
http://www.live-leds.de

JINX configure properly, manual
http://www.led-genial.de/mediafiles//Sonstiges/Jinx_konfigurieren.pdf

GLEDIATOR - LED Matrix Control Software
http://www.solderlab.de/index.php/software/glediator

LED-PLAYER-M

Manual, Connections, Power supply, Configuration, Software

Production and distribution

DIAMEX Produktion und Handel GmbH
Innovation Park Wuhlheide
Köpenicker Straße 325, House 41
12555 Berlin

Phone: 030-65762631
Email: info@diamex.de
Homepage: http://www.diamex.de
Online-Shop: http://www.led-genial.de