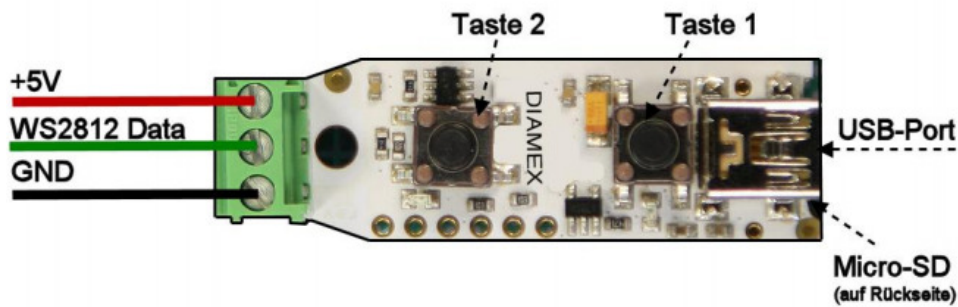


DIAMEX LED PLAYER S2

Player for TPM2 files on LED strips and panels with digital LEDs

FUNCTIONS

There are CD players, DVD players, MP3 players, video players and many more. Now there is the LEDPlayer from Diamex. The LED player play LED effect sequences from an SD card and displays them on the connected LED strips, panels or single light-emitting diodes WS2812 or compatible. Via the USB connection, the LED player can also play effects directly from the PC. For this purpose, any program can be used which can output data in TPM2 format via the serial interface (for example JINX! Or Glediator).



Technical specifications:

- Connection for LEDs and Strips with WS2812 compatible LEDs
- Maximum number: 512 light-emitting diodes

Micro FUNCTIONS

- SD card up to 32 gigabytes (SDHC)
- USB 2.0 port, virtual COM port
- Files and serial data in TPM2 format
- 2 buttons to operate the player
- Control by high-performance 32-bit ARM-Cortex-M microcontroller
- Board size: 40 x 14mm

Power supply

LEDs require only a relatively small current. However, this can add up to impressive values for long stripes or large panels. At 100% white this LED needs 60mA at 5Volt. This is not very much at first, but with 10 LEDs, this is already 600mA, which means a normal USB 2.0 port is already overloaded since it can usually deliver a maximum of 500mA (according to the USB specification). For this reason, we always recommend the use of a power supply designed according to the required LEDs.

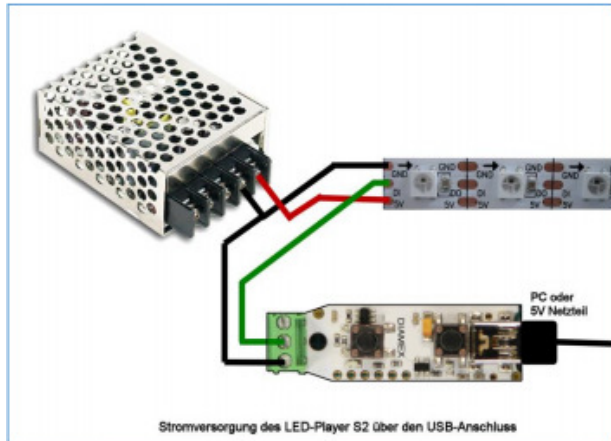
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Variant 1: Supply the LED player via USB port

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

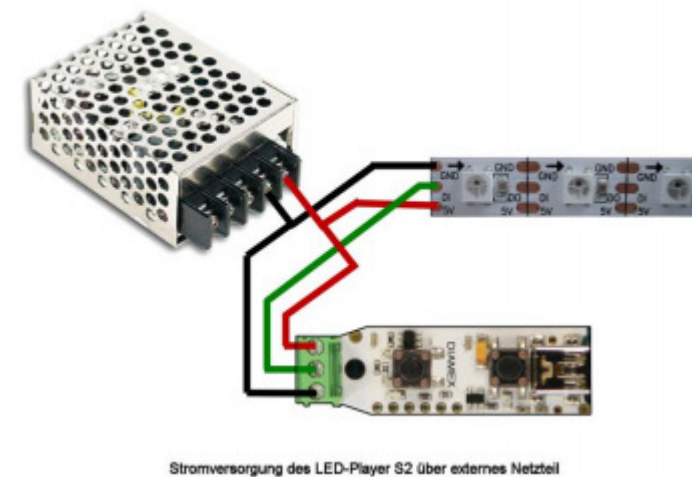
The LED player is powered by the USB port. This can be a connected PC or a 5 Volt power supply.



Variant 2: Supply the LED player with power supply

In this variant, the LED player must not be connected with the USB port of the PC. It is used here only for playing files from the SD card (standalone).

Connect the + 5V line of the power supply to the + 5V terminal of the LED player and supplies it with power.



IMPORTANT INSTRUCTIONS

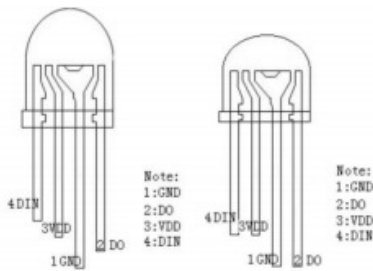
Do not connect both power supplies to the LED Player-S2 at the same time - either power supply via USB or power supply via the terminal block. Never connect a higher voltage than 5 Volt to the LED-Player S2. Make sure the polarity of the power supply is correct. A polarity reversal leads to the immediate destruction of the LED player and the connected LEDs.

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LED connector

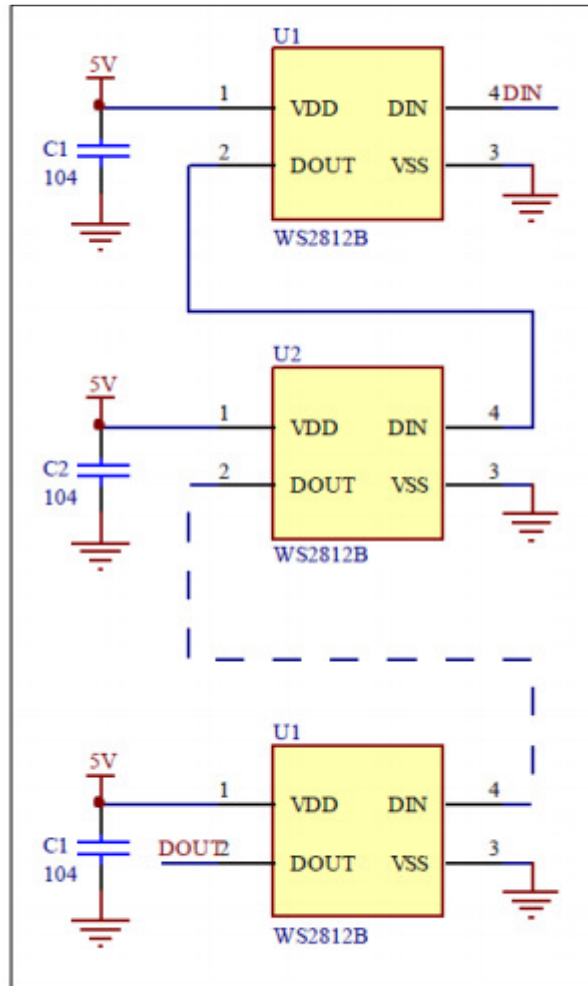
WS2812B, PL9823, APA-106, SK6812, and compatible have a data input (DI) and a data output (DO) in addition to the power supply pins (ground and + 5V). If several LEDs are required, the data output (DO) of the first LED must simply be connected to the data input (DI) of the next LED (daisy chain principle).



PL9823 LED



LED-Stripe mit WS2812



WS2812 Daisy-Chain

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Number of light-emitting diodes

The DIAMEX LED-Player S2 can control up to 512 LEDs. The configuration file on the SD card can limit the maximum number if only a few LEDs are connected. This means that only small amounts of data have to be generated and transmitted.

Arrangement of colors

The arrangement of the colors can vary from manufacturer to manufacturer. In the case of classic WS2812 LEDs, the green-red-blue (GRB) arrangement, this is also the default setting of the LED-player S2. If you find that the colors are not correct (for example, in test mode), the configuration in the configuration file must be changed.

RGBW light-emitting diodes (experimental)

The support for RGBW light-emitting diodes (SK6812) can be activated via the configuration file. These LEDs have integrated a fourth white system in addition to the three standard colors red, green and blue.

This guarantees a clean white that is not produced from the three basic colors. Since the TPM2 format does not (yet) support these LEDs, the LED player S2 calculates the white component from the basic colors red, green and blue and controls the four individual LEDs accordingly. The algorithm for this is experimental and can be changed in a later update.

USB port

The DIAMEX LED player can directly play TPM2 data from the PC. For this purpose, a virtual COM port is set up via USB. In order for your PC to recognize the LED player, the INF driver file, which is included in the software package for the LED player, is required. Using the Windows Device Manager, select "Update Driver Software" and then select the file "led-player.inf" from the software package. On Windows 8, you may need to disable "Force Windows 8 driver signing". You can find out how to do this on the Internet by searching for "Driver Signature Windows 8" in Google.

ATTENTION!

Under Windows 10, no driver installation is required; the LED-Player S2 is automatically registered as a "Serial USB device" after being plugged into the PC for the first time. Programs such as JINX or GLEDIATOR can output TPM2 data directly to the virtual USB COM port. The baud rate setting is ignored, USB automatically uses the maximum possible speed.

RED and GREEN LEDs

The red LED is only used to visualize the data output to the light-emitting diodes. If you are not sure whether the connected LEDs are working, you can use the flicker of the red LED to see that data is being transmitted to the light-emitting diodes.

The green LED is used for status and error display:

Slow flashing (2 sec on, 2 sec off)	No SD card inserted, LED player is waiting for data from the USB port.
Fast flashing (0.5 sec on, 0.5 sec off)	Pressing the button to play the next file will wait.
2 x flashing, pause	SD card cannot be read
3 x flashing, pause	There is no "file_xx" in _CONFIG_ and there are no .TP2 files on the SD card.
4 x flashing, pause	Current file does not have a valid TPM2 format or cannot be read.
LED lights constantly	File is played from the SD card.

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Buttons 1 and 2

Button 1 is used to start playback of the next or the first file. If autostart = 0 is specified in the configuration file, key 1 must be pressed to play the first file. If key 1 is pressed while a file is being played, the next file is immediately transferred, if this is the last file, the first file is started again. If the "STOP" flag is set in the file configuration, key 1 must always be pressed to start playback of the next file.

Pressing 2 plays back the current file. If key 2 is pressed while a file is being played, it will immediately jump to the beginning of the file and restart it.

LED function test

The LED-Player S2 has a function test for the connected LEDs, which can also be activated without a connected PC and without a connected SD card. The test can be activated under the following conditions:

- No SD card inserted (slow green LED flashing).
- The SD card cannot be read (2 x flashing of the green LED).
- An SD card has been inserted and there is no configuration file and no valid *.TP2 file (3 x green LED flashing).
- An SD card has been inserted, there are no "file_xx" entries in the configuration file and a valid *.TP2 file was not found (3 x flashing of the green LED). In this case, the operating parameters of the LED player S2 are read from the configuration file and applied to the function test.

Press key 1 to start the function test. Pressing 1 repeatedly switches between different colors. If the colors do not correspond to those listed in the following list, the operating parameters must be adapted in the configuration file.

Press 1x	All LEDs light up in rainbow effect.
Press 2x	All LEDs light up in red
Press 3x	All LEDs light up in yellow
Press 4x	All LEDs light up in green
Press 5x	All LEDs light up in turquoise
Press 6x	All LEDs light up in blue
Press 7x	All LEDs light up in cyan
Press 8x	All LEDs light up in white

Button 2 deactivates the function test. Pressing button 1 again restarts the function test with the last selected color if the power supply has not been interrupted before.

What is TPM2?

TPM is the abbreviation for "Transport Protocol for Matrices", a popular data protocol for the control of LED panels. Many freely available programs now support this protocol, such as e.g. JINX or GLEDIATOR. However, it does not have to be an LED panel; this protocol is also ideally suited for one-dimensional LED strips. The data transfer from the PC to the LED player takes place at the maximum speed via the USB interface, so that a rate of 25 frames per second can be achieved to ensure flicker-free output. TPM2 files are also played directly from the Micro SD card with the DIAMEX LED player, additionally the configuration file is required.

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Structure of a TPM2 file

A frame consists of a header (4 bytes), the LED data (3 bytes per LED) and a footer (1 byte). Several frames are simply stored and played back one behind the other. The default rate is 25 frames per second, but in the DIAMEX LED player this rate can be changed via the configuration file and adapted to your own requirements.

Frame-Header	C9 DA HH LL	HH LL = number of the following data bytes
LED-Data	RR GG BB	3 bytes per LED (can also be GG RR BB for WS2812)
Frame-Footer	36	

Play TPM2 files from SD card

TPM2 files are created, among other things, by the programs JINX !, GLEDIATOR or the tool LED-EDDY and can be copied from a PC with a suitable card reader to a micro SD card. Optionally, a configuration file can be created that defines the order of the files to be played and their play parameters. However, this is not absolutely necessary for the LED-Player S2.

The following notes are important to apply to the files on the SD card:

- All files only in 8.3 formats. Example: ABCDEFGH.TP2
- Do not use long filenames as under Windows or Linux.
- All files must be in the main directory of the SD card.
- A maximum of 100 TPM2 files are possible on an SD card.
- The configuration file must be `_CONFIG_`, but is not required for operation with standard parameters.
- The SD card must be formatted in FAT32 format.
- SD and SDHC cards can be used; SDXC cards are not currently supported.

In principle always as many LEDs are controlled which are also stored in the TPM2 file or the maximum number of LEDs defined in the configuration file. If, for example, 30 LEDs are present, but only 16 are stored in the file, the last 14 LEDs remain dark. If 50 LEDs are stored in the file, the data of the excess 20 LEDs are simply discarded. Therefore, when storing the TPM2 files, always ensure that the number of LEDs matches your configuration.

If there is no configuration file on the SD card, or if there is a configuration file and there are no "file_xx" entries, the main directory of the SD card is searched for files with the .TP2 extension. If files with this extension are found, these files are played in sorted order. If a configuration file is missing without "file_xx" entries, the operating parameters from this file are used to play the files.

The play order can be specified by clever naming of the .TP2 files. Names with attached numbers can only be sorted correctly if the numbers have an identical number of digits.

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Right	Wrong
file_10.TP2	file_01.TP2
file_1.TP2	file_02.TP2
file_2.TP2	file_09.TP2
file_9.TP2	file_10.TP2

All files are played only once, after the end of the last file the first file is started again. The files are played without stop one after the other. Settings for brightness correction (BRIGHT) and playback speed (SPEED) are read from the configuration file, if available.

Structure of the configuration file

The file must always be named `_CONFIG_` and located in the main directory (root) of the SD card. The configuration file is read and analyzed first when the SD card is inserted. In this file the files to be played can be defined and some settings for the operation of the LED-Player S2 can be made.

Notes on the lines in the configuration file:

- All lines must be connected with CR + LF (13,10) or only with LF (10).
- There is no distinction between upper and lower case.
- Spaces are ignored.
- Invalid or incorrectly written parameter names are ignored; no error message is output. If the desired parameter does not work as desired, please check the correct spelling.
- Comments in the configuration file start with the character `#`
- There must be no comments at the end of valid parameter definitions, which make the entry invalid.

Operating parameters from the configuration file remain stored in the LED player S2 even after the SD card has been removed, as long as the power supply is present. Default values are restored after reboot without a configuration file. As soon as an SD card with a modified configuration file is inserted, the operating parameters are automatically adopted and the old values are overwritten.

Valid lines in file `_CONFIG_`

Case is ignored.

Incorrectly written parameter names or invalid values are ignored and the default value is used instead.

`AUTOSTART=x`

X = 0: After inserting the SD card, a key press is waiting for the playback of the first file to start.

X = 1: The first file is started automatically after inserting the SD card.

Default: 1

`LEDCOUNT=xxx`

Maximum number of connected LEDs. Xxx = 8..512

Default: 512

`LEDBITS=xx`

Number of bits per LED. Xx = 24 (RGB) or 32 (RGBW)

Standard: 24 (RGB)

`REMAPCOLORS=xxx`

Arrangement of colors. Possible values: RGB, RBG, GRB, GBR, BRG, BGR

Default: GRB (for WS2812)

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BRIGHT=xxx

Brightness factor in% for files without entry in the configuration file.

Xxx = 0..200

Default: 100

SPEED=xx

Play speed in frames / sec. For files without an entry in the configuration file. Xx = 1 ... 50

Default: 25

STOPONERROR=x

X = 0: Invalid TPM2 files or read errors ignore the file and jump to the next file.

X = 1: In the case of invalid TPM2 files or read errors, the playback is aborted and the error is indicated by 4 x flashing of the green LED.

Default: 0

INITTIME=xxx

Length of the init, in which all LEDs light up to the test (in 100ms). 0 = off

Default 5 (= 500ms)

INITCOLORON = rrr, ggg, bbb

LED color during the init time. Valid values 0..255.0..255.0..255

Default: 30.30.30

INITCOLOROFF=rrr,ggg,bbb

LED color after the init time, Valid values 0..255.0..255.0..255

Default: 0.0.0

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If the sequence of the files is selected as well as file-specific parameters, these must be entered into the configuration file.

(Leads are only inserted for better readability, they are ignored by the LED player.)

```
[A]           [B]           [C] [D] [E] [F]  
file_xx = ABCDEFGH.TP2, 25, 1, 0, 100
```

If parameters C, D, E, F are not required, they can be omitted.

```
file_xx = ABCDEFGH.TP2
```

[A] Index for a file entry. Xx is a two-digit digit (00.99). The order of the files being played does not depend on this number, but only on the order of the file entries in the configuration file.

[B] Name of the file. Please pay attention to the 8.3 format. Long filenames cannot be processed.

[C] The output speed in frames / second. Valid values are 1..50. **Default: 25**

[D] How often should the file be played (loops) ?. Valid values are 1..255, 0 means infinite repetition. Cancel only by pressing button A. **Default: 1**

[E] ID for stop at the end of the file. Valid values are 0 for no stop, 1 for stop. **Default: 0**

[F] Playback brightness in%. Valid values are 0..200. **Default: 100**

If the parameters C, D, E, F are not required, they can be omitted, in which case the previously described standard values apply.

```
file_01 = DATEI.TP2
```