TikZ Oscilloscope Package

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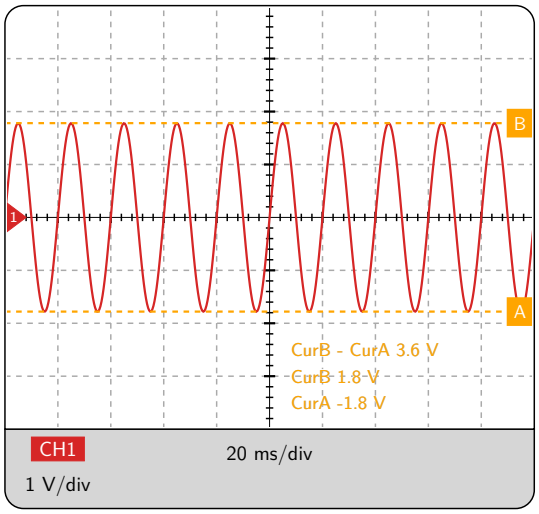
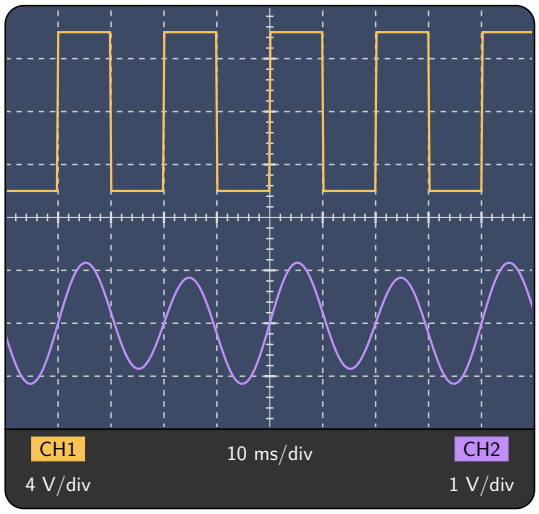
1 Introduction





This package is a modest alternative to the `pst-osci` package (not maintained anymore). It allows you to draw oscilloscope "screen shots" with LaTeX, TikZ and pgfplots.

Contact

Some features are not implemented yet, but the package is already usable for basic representations. I'm doing this for fun and still learning how to make LaTeX packages. Therefore, I'm open to any suggestion or contribution :

`contact at ensciences dot fr`

Issues tracker

An issues tracker is available at :

`https://framagit.org/ThibGiauffret/latex_packages/-/issues`.

Feel free to report any bug you find or send suggestions.

Important note : Please indicate the concerned package name in the title of the issue. For example, if you want to report an issue about this package, please use the following title : `[tikz-osci] My issue report title`.

2 Usage

The package is loaded with the command `\usepackage{tikz-osci}`. It defines a single command, `\osci`, which takes a list of options as argument. The options allow you to configure and customize the oscilloscope screen view :

scale	Scale of the oscilloscope (with scalebox).	Default: 1
rounded corners	Radius of the oscilloscope corners (in pt).	Default: 10
second channel	1 if the second channel is enabled, 0 otherwise.	Default: 0
screen offset one	Vertical screen offset of the first channel.	Default: 0
screen offset two	Vertical screen offset of the second channel.	Default: 0
time div	Time division (in ms).	Default: 20
voltage div one	Voltage division of the first channel (in V).	Default: 1
voltage div two	Voltage division of the second channel (in V).	Default: 1
sample rate	Sample rate.	Default: 200
xy mode	1 if the oscilloscope is in XY mode (Lissajous curve), 0 otherwise.	Default : 0
math mode	1 for addition, 2 for subtraction, 3 for multiplication, 4 for division, 0 otherwise. xy mode option must be set to 0.	Default: 0
math mode hide source	0 to display channels CH1 and CH2 with the third channel, 1 to hide them.	Default : 0
func one	Expression of the first channel (pgf maths format). Trigonometric functions are defined in degrees.	Default: 2*sin(2*180/0.020*x)
func two	Expression of the second channel (pgf maths format). Trigonometric functions are defined in degrees.	Default: 1*sin(2*180/0.020*x) + 0.2*sin(2*180/0.040*x)
indicators	1 if the channel indicators are enabled, 0 otherwise.	Default: 1
horizontal cursor one	Horizontal position of the first cursor (between -4 and 4). false to disable.	Default: false
horizontal cursor two	Horizontal position of the second cursor (between -4 and 4). false to disable.	Default: false
vertical cursor one	Vertical position of the first cursor (between -4 and 4). false to disable.	Default: false
vertical cursor two	Vertical position of the second cursor (between -4 and 4). false to disable.	Default: false
cursor precision	Number of digits after the decimal point for the cursor values.	Default: 1
color one	Color of the first channel (in hexadecimal).	Default: D62626
color text one	Text color of the first channel (in hexadecimal).	Default: FFFFFF
color two	Color of the second channel (in hexadecimal).	Default: 1053AF
color text two	Text color of the second channel (in hexadecimal).	Default: FFFFFF
color three	Color of the XY mode and the math mode (in hexadecimal).	Default: 2E8B73
color text three	Text color of the XY mode and the math mode (in hexadecimal).	Default: FFFFFF
graph back color	Background color of the graph (in hexadecimal).	Default: FFFFFF
info back color	Background color of the information box (in hexadecimal).	Default: D6D6D6
info text color	Text color of the information box (in hexadecimal).	Default: 000000
main axis color	Color of the main axis (in hexadecimal).	Default: 000000
grid color	Color of the grid (in hexadecimal).	Default: CCCCCC

`horizontal cursor color`	Color of the horizontal cursor (in hexadecimal).	Default: `FFA500`
`vertical cursor color`	Color of the vertical cursor (in hexadecimal).	Default: `800080`
`smooth one`	1 to smooth the first channel, 0 otherwise.	Default: 0
`smooth two`	1 to smooth the second channel, 0 otherwise.	Default: 0
`smooth three`	1 to smooth the third channel, 0 otherwise.	Default: 0

A quick documentation in french is available here :

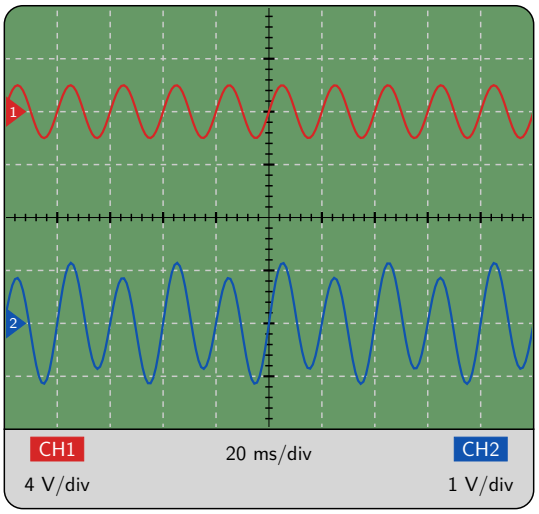
`https://www.ensciences.fr/read.php?article=1220`

3 Examples

For more examples, see the `tikz-osci-example.tex` file.

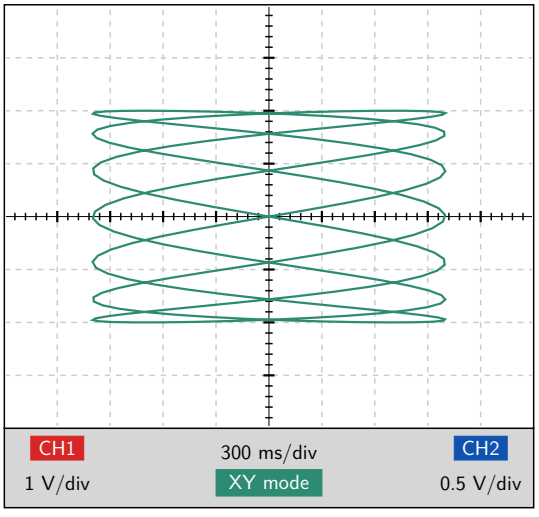
Two channels plot with custom background color

```
\osci[%
    scale=0.7,
    second channel=1,
    screen offset one=2,
    screen offset two=-2,
    time div=20,
    voltage div one=4,
    voltage div two=1,
    sample rate=200,
    xy mode=0,
    func one=2*sin(2*180/0.020*x),
    func two=1*sin(2*180/0.020*x) +
    0.2*sin(2*180/0.040*x),
    color one=D62626,
    color two=1053AF,
    graph back color=669966,
    info back color=D6D6D6,
    grid color=CCCCCC
]
```



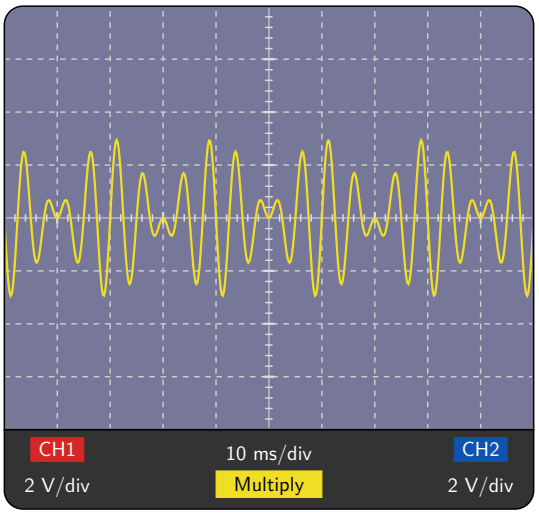
Lissajous curve (XY mode) and no rounded corner

```
\osci[%
    scale=0.7,
    rounded corners=0,
    second channel=1,
    time div=300,
    voltage div one=1,
    voltage div two=0.5,
    sample rate=500,
    xy mode=1,
    func one=sin(7*x),
    func two=sin(2*x),
    indicators=1,
    graph back color=FFFFFF,
    info back color=D6D6D6,
    info text color=000000,
    main axis color=000000,
    grid color=CCCCCC,
]
```



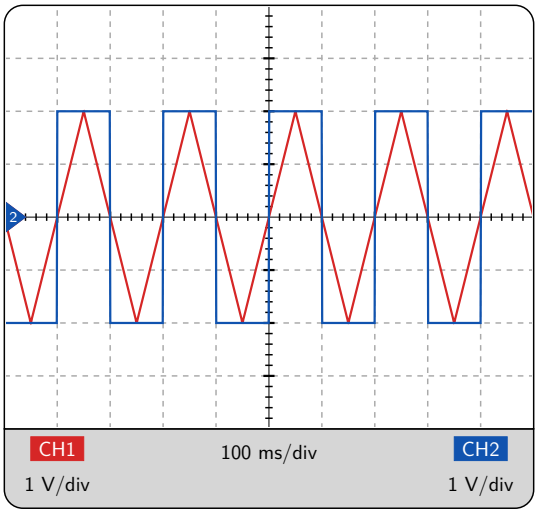
Math mode (multiply) with hidden sources and dark mode

```
\osci[%
    scale=0.7,
    second channel=1,
    time div=10,
    voltage div one=2,
    voltage div two=2,
    sample rate=500,
    xy mode=0,
    math mode=3,
    math mode hide source=1,
    func one=2*sin(2*180/0.040*x),
    func two=3*sin(2*180/0.005*x),
    indicators=0,
    color three=F0DE25,
    color text three=000000,
    graph back color=777799,
    info back color=333333,
    info text color=FFFFFF,
    main axis color=DDDDDD,
    grid color=CCCCCC,
]
```



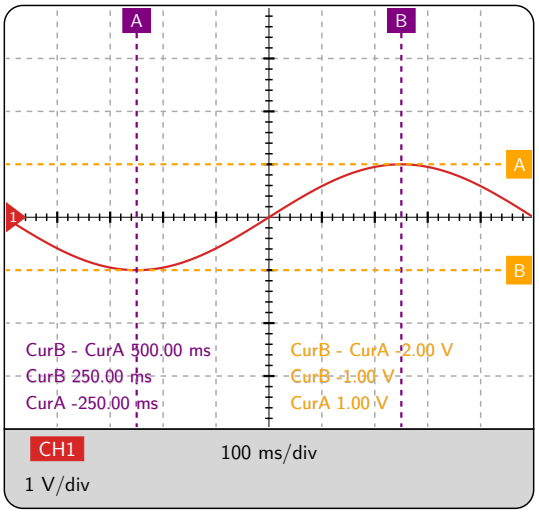
Common periodic signals

```
% Square wave function
\pgfmathdeclarefunction{square}{4}{%
\pgfmathparse{(sin(2*180*x/#2+#4) +
    #3>0?#1:-#1)}%
}

% Triangle wave function
\pgfmathdeclarefunction{triangle}{4}{%
\pgfmathparse{#1*asin(sin(2*180/#2*x +
    #4))/90}%
}

\osci[%
    scale=0.7,
    second channel=1,
    sample rate=1000,
    time div=100,
    func one={triangle(2,0.2,0,0)},
    func two={square(2,0.2,0,0)},
    smooth one = 1,
    smooth two = 0,
]
```



Vertical and horizontal cursors (values displayed with two digits)

```
\osci[%
    scale=0.7,
    second channel=0,
    time div=100,
    voltage div one=1,
    sample rate=200,
    func one={sin(2*180*x)},
    vertical cursor one=-2.5,
    vertical cursor two=2.5,
    horizontal cursor one=1,
    horizontal cursor two=-1,
    cursor precision=2
]
```



4 License

This package is distributed under the terms of the **LaTeX Project Public License** (LPPL), version 1.3c or later. The latest version of this license is available at `http://www.latex-project.org/lppl.txt`.

5 Credits

This package requires the following packages :

- `xcolor` maintained by the *LaTeX3 Project* (license LPPL 1.3c) ;
- tikz maintained by the *TikZ and PGF Project* (license LPPL 1.3c) ;
- pgfkeys maintained by the *Till Tantau* (license LPPL) ;
- pgfplots maintained by the *Christian Feuersänger* (license LPPL).

6 Changelog

- **0.4.0** (2023/10/24) :

  Added cursor and smooth options.

  Added square and triangle plot examples.

  Fixed the pgf keys declaration.

- **0.3.0** (2023/10/08) :

  Implemented XY mode and math (add, subtract, multiply, divide) functionalities.

- **0.2.0** (2023/10/07) :

  Added `color text one`, `color text two` and `color text xy` options.

  Added `indicators` option.

  Added `rounded corners` option.

  Fixed the main axis color not being applied.

  Reworded the documentation and the example file.

- **0.1.1** (2023/10/06) :

  Renamed `sub axis color` to `grid color`.

  Renamed `expr one` and `expr two` to `func one` and `func two`.

  Updated package files names.

- **0.1.0** (2023/10/06) : Initial release. XY mode not implemented yet.