Convert a length into one with another unit with LuaTeX

Herbert Voß

May 7, 2020

Contents

1 Using

```
\usepackage{unitconv}
```

2 Macros

```
\convTeXLength*[⟨unit⟩][⟨digits⟩]{⟨TeX length⟩}
\convLength*[⟨unit⟩][⟨digits⟩]{⟨value⟩}[⟨unit⟩]
```

The star version prints the number in scientific notation. The default setting for the unit is `cm` and for the number of digits `-1` (print all digits). The dynamic units `em`, `ex`, and `mu` depend on the current fontsize.

- This package works only with `lualatex`!
- With AmsMath you have to load the package before `unitconv`.

3 The units

Short	*Long*
bp	Big Point (72 bp/in)
cc	Cîcero (1 cc=12 dd)
cm	Centimeter
dd	Didôt (1157 dd = 1238 pt)
em	Width of »M« in the current font
ex	Height of »x« in the current font
in	Inch (72.27 pt)
km	Kilometer
m	Meter
mm	Millimeter
mu	Math unit (1 mu=1/18em)
pc	Pica (12 pt/pc)
pt	(TEX-)Points (1/72.27 Inch)
px	Pixel, 1 px=1/72in (pdfTEX)
sp	Scaled Point (65536 sp/pt)

4 Examples

4.1 Converting a TEX length

The current example linewidth is 202.32779pt, which is
7.1110125070556 cm
201.57390360053 bp
15.757493321703 cc
189.09139252336 dd
18.477423744292 em
43.070826131013 ex
2.7996096582261 in
7.1110125070556e-05 km
0.071110125070556 m
71.110474965381 mm
332.59362739726 mu
16.860649166667 pc
202.32779 pt
201.57390360053 px
4.046556e+06 sp

```
The current example linewidth is
\the\linewidth, which is

\convTeXLength{\linewidth}\\
\convTeXLength[bp]{\linewidth}\\
\convTeXLength[cc]{\linewidth}\\
\convTeXLength[dd]{\linewidth}\\
\convTeXLength[em]{\linewidth}\\
\convTeXLength[ex]{\linewidth}\\
\convTeXLength[in]{\linewidth}\\
\convTeXLength[km]{\linewidth}\\
\convTeXLength[m]{\linewidth}\\
\convTeXLength[mm]{\linewidth}\\
\convTeXLength[mu]{\linewidth}\\
\convTeXLength[pc]{\linewidth}\\
\convTeXLength[pt]{\linewidth}\\
\convTeXLength[px]{\linewidth}\\
\convTeXLength*[sp]{\linewidth}
```

The current character width of M is 1 em, which is
0.38484869998461 cm
10.90919959352 bp
0.85279709659582 cc
10.233644859813 dd
1.0 em
2.3309973688468 ex
0.15151515151515 in
3.8484869998461e-06 km
0.0038484869998461 m
3.8485059361886 mm
18.0 mu
0.9125 pc
10.95 pt
10.90919959352 px
2.190000e+05 sp

```
The current character width of M
is 1\,em, which is

\convTeXLength{1em}\\
\convTeXLength[bp]{1em}\\
\convTeXLength[cc]{1em}\\
\convTeXLength[dd]{1em}\\
\convTeXLength[em]{1em}\\
\convTeXLength[ex]{1em}\\
\convTeXLength[in]{1em}\\
\convTeXLength[km]{1em}\\
\convTeXLength[m]{1em}\\
\convTeXLength[mm]{1em}\\
\convTeXLength[mu]{1em}\\
\convTeXLength[pc]{1em}\\
\convTeXLength[pt]{1em}\\
\convTeXLength[px]{1em}\\
\convTeXLength*[sp]{1em}
```

The current example linewidth is 202.32779pt, which is
201.574 bp
15.757 cc
7.111 cm
189.091 dd
18.477 em
43.071 ex
2.800 in
0.000 km
0.071 m
71.110 mm
332.594 mu
16.861 pc
202.328 pt
201.574 px
4.046556e+06 sp

```
The current example linewidth is
\the\linewidth, which is

\convTeXLength[bp][3]{\linewidth}\\
\convTeXLength[cc][3]{\linewidth}\\
\convTeXLength[cm][3]{\linewidth}\\
\convTeXLength[dd][3]{\linewidth}\\
\convTeXLength[em][3]{\linewidth}\\
\convTeXLength[ex][3]{\linewidth}\\
\convTeXLength[in][3]{\linewidth}\\
\convTeXLength[km][3]{\linewidth}\\
\convTeXLength[m][3]{\linewidth}\\
\convTeXLength[mm][3]{\linewidth}\\
\convTeXLength[mu][3]{\linewidth}\\
\convTeXLength[pc][3]{\linewidth}\\
\convTeXLength[pt][3]{\linewidth}\\
\convTeXLength[px][3]{\linewidth}\\
\convTeXLength*[sp][3]{\linewidth}
```

The current width of the letter M is 1 em, which is
10.909 bp
0.853 cc
0.385 cm
10.234 dd
1.000 em
2.331 ex
0.152 in
0.000 km
0.004 m
3.849 mm
18.000 mu
0.912 pc
10.950 pt
10.909 px
2.190000e+05 sp

```
The current width of the letter M is
1\,em, which is

\convTeXLength[bp][3]{1em}\\
\convTeXLength[cc][3]{1em}\\
\convTeXLength[cm][3]{1em}\\
\convTeXLength[dd][3]{1em}\\
\convTeXLength[em][3]{1em}\\
\convTeXLength[ex][3]{1em}\\
\convTeXLength[in][3]{1em}\\
\convTeXLength[km][3]{1em}\\
\convTeXLength[m][3]{1em}\\
\convTeXLength[mm][3]{1em}\\
\convTeXLength[mu][3]{1em}\\
\convTeXLength[pc][3]{1em}\\
\convTeXLength[pt][3]{1em}\\
\convTeXLength[px][3]{1em}\\
\convTeXLength*[sp][3]{1em}
```

The current example linewidth is 202.32779pt, which is
201.57390360053 bp
16 cc
7.1 cm
189.09 dd
18.477 em
43.0708 ex
2.79961 in
0.000071 km
0.0711101 m
71.11047497 mm
332.593627397 mu
16.8606491667 pc
202.32779000000 pt
201.573903600534 px
4.046556e+06 sp

```
The current example linewidth is
\the\linewidth, which is

\convTeXLength[bp][-1]{\linewidth}\\
\convTeXLength[cc][0]{\linewidth}\\
\convTeXLength[cm][1]{\linewidth}\\
\convTeXLength[dd][2]{\linewidth}\\
\convTeXLength[em][3]{\linewidth}\\
\convTeXLength[ex][4]{\linewidth}\\
\convTeXLength[in][5]{\linewidth}\\
\convTeXLength[km][6]{\linewidth}\\
\convTeXLength[m][7]{\linewidth}\\
\convTeXLength[mm][8]{\linewidth}\\
\convTeXLength[mu][9]{\linewidth}\\
\convTeXLength[pc][10]{\linewidth}\\
\convTeXLength[pt][11]{\linewidth}\\
\convTeXLength[px][12]{\linewidth}\\
\convTeXLength*[sp][13]{\linewidth}
```

2.60 em
5.20 em
7.80 em

```
\convTeXLength[em][2]{1}\\ % default is cm
\convTeXLength[em][2]{2}\\
\convTeXLength[em][2]{3}
```

The current example linewidth is 202.32779pt, which is
18.48 em
43.07 ex
332.59 mu

Test
8.13 em
18.96 ex
146.38 mu

```
The current example linewidth is
\the\linewidth, which is

\convTeXLength[em][2]{\linewidth}\\
\convTeXLength[ex][2]{\linewidth}\\
\convTeXLength[mu][2]{\linewidth}

\Huge Test\\
\convTeXLength[em][2]{\linewidth}\\
\convTeXLength[ex][2]{\linewidth}\\
\convTeXLength[mu][2]{\linewidth}
```

4.2 Converting a value with given unit into another one

1234.5 m
123450.0 cm
1.234506e+06 mm
3499402.985833 bp
1.2345 km

```
\convLength[m]{1.2345}[km]\\
\convLength[cm]{1.2345}[km]\\
\convLength*[mm]{1.2345}[km]\\
\convLength[bp]{1.2345}[km]\\
\convLength[km][4]{3499402.985833}[bp]
```