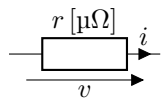


CircuitikZ まとめ

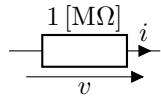
最終更新：2021 年 03 月 13 日

1 描画の基本

=でラベル, i で電流, v で電圧.



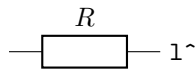
```
\begin{circuitikz}
\draw (0, 0) to [R=$r$, \si{\micro\ohm}], i=$i$, v=$v$] (2, 0);
\end{circuitikz}
```



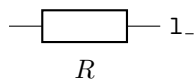
```
\begin{circuitikz}
\draw (0, 0) to [R=\SI{1}{M\ohm}], i=$i$, v=$v$] (2, 0);
\end{circuitikz}
```

1.1 ラベル

ラベルを上に出す場合は l^{\wedge} , 下に出す場合は l_{\wedge} を使う.

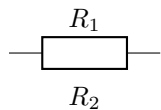


```
\begin{circuitikz}
\draw (0, 0) to [R, l^=$R$] (2, 0);
\end{circuitikz}
```



```
\begin{circuitikz}
\draw (0, 0) to [R, l_{\wedge}=$R$] (2, 0);
\end{circuitikz}
```

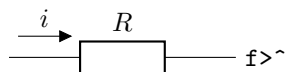
ラベルを上下に出したければ a^{\wedge} , l_{\wedge} を使う.



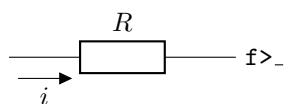
```
\begin{circuitikz}
\draw (0, 0) to [R, a^=$R_1$, l_{\wedge}=$R_2$] (2, 0);
\end{circuitikz}
```

1.2 電流

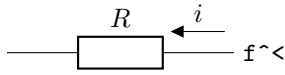
電流は i の代わりに f も使える. $f=\$i\$$ にすればいい感じに空気を読んでくれる. 自分で場所を指定したい場合は以下の 8 通り.



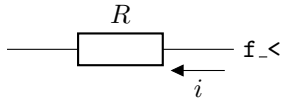
```
\begin{circuitikz}
\draw (0, 0) to [R, l=$R$, f>^=$i$] (3, 0);
\end{circuitikz}
```



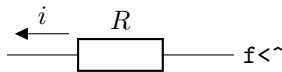
```
\begin{circuitikz}
\draw (0, 0) to [R, l=$R$, f>_{\wedge}=$i$] (3, 0);
\end{circuitikz}
```



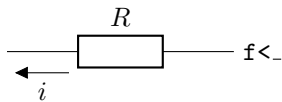
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, f^<=$i$] (3, 0);
\end{circuitikz}
```



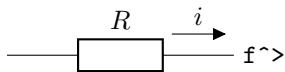
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, f_<=$i$] (3, 0);
\end{circuitikz}
```



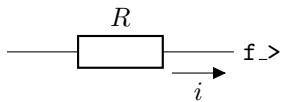
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, f^>=$i$] (3, 0);
\end{circuitikz}
```



```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, f_>=$i$] (3, 0);
\end{circuitikz}
```

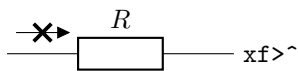


```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, f^>=$i$] (3, 0);
\end{circuitikz}
```

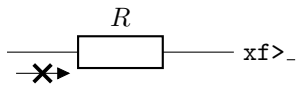


```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, f_>=$i$] (3, 0);
\end{circuitikz}
```

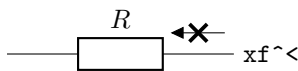
`xf=\relax` を使えば、電流の矢印に×がつく.



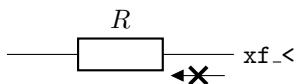
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, xf^>=\relax] (3, 0);
\end{circuitikz}
```



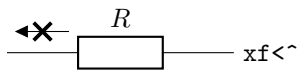
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, xf_>=\relax] (3, 0);
\end{circuitikz}
```



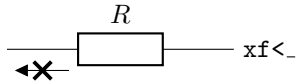
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, xf^<=\relax] (3, 0);
\end{circuitikz}
```



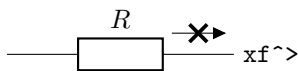
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, xf_<=\relax] (3, 0);
\end{circuitikz}
```



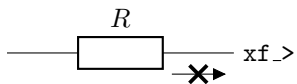
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, xf<^=\relax] (3, 0);
\end{circuitikz}
```



```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, xf<_=\relax] (3, 0);
\end{circuitikz}
```



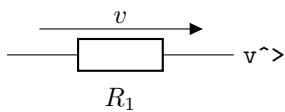
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, xf^>=\relax] (3, 0);
\end{circuitikz}
```



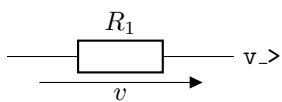
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R$, xf_>=\relax] (3, 0);
\end{circuitikz}
```

1.3 電圧

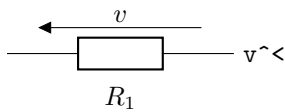
例の三角形の奴はそのうち作るかも.



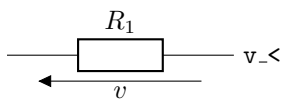
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R_1$, v^>=$v$] (3, 0);
\end{circuitikz}
```



```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R_1$, v_>=$v$] (3, 0);
\end{circuitikz}
```



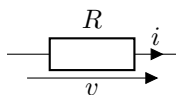
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R_1$, v^<=$v$] (3, 0);
\end{circuitikz}
```



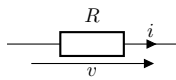
```
\begin{circuitikz}
  \draw (0, 0) to [R, l=$R_1$, v_<=$v$] (3, 0);
\end{circuitikz}
```

1.4 拡大縮小

scale を指定する. 素子の大きさも変更する場合は transform shape を付ける.



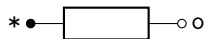
```
\begin{circuitikz}[scale=0.75]
  \draw (0, 0) to [R, l=$R$, i=$i$, v=$v$] (2, 0);
\end{circuitikz}
```



```
\begin{circuitikz}[scale=0.75, transform shape]
  \draw (0, 0) to [R, l=$R$, i=$i$, v=$v$] (2, 0);
\end{circuitikz}
```

1.5 端点処理

*, o, d を使う. 導線のみ描く場合は short を使う.



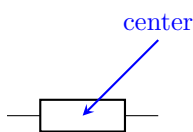
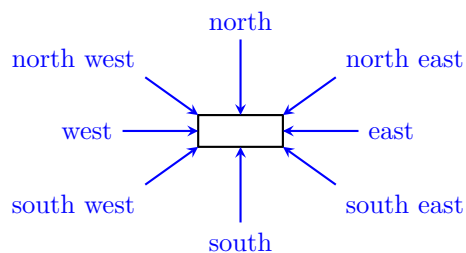
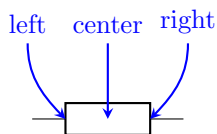
```
\begin{circuitikz}
  \draw (0, 0) to [R, *-o] (2, 0);
\end{circuitikz}
```



```
\begin{circuitikz}
  \draw (0, 0) to [short, d-] (2, 0);
\end{circuitikz}
```

1.6 アンカー

name で素子に名前を付けると, 素子近傍の座標が定義される.

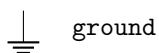


```
\begin{circuitikz}
  \draw (0, 0) to [R, name=Resistor] (2, 0);
  \draw[thick, <-, >=stealth, blue] (Resistor.center) --
    +(1, 1) node [above] {center};
\end{circuitikz}
```

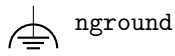
2 素子

2.1 接地

node のオプションに指定する.

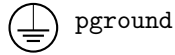


```
\begin{circuitikz}
  \draw (0, 0) node [ground] {};
\end{circuitikz}
```



nground

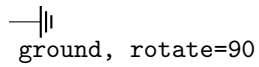
```
\begin{circuitikz}
  \draw (0, 0) node [nground] {};
\end{circuitikz}
```



pground

```
\begin{circuitikz}
  \draw (0, 0) node [pground] {};
\end{circuitikz}
```

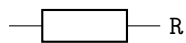
■Tips node を回転させる場合は rotate を指定する.



ground, rotate=90

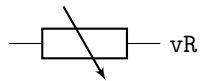
```
\begin{circuitikz}
  \draw (0, 0) node [ground, rotate=90] {};
\end{circuitikz}
```

2.2 抵抗



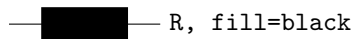
R

```
\begin{circuitikz}
  \draw (0, 0) to [R] (2, 0);
\end{circuitikz}
```



vR

```
\begin{circuitikz}
  \draw (0, 0) to [vR] (2, 0);
\end{circuitikz}
```



R, fill=black

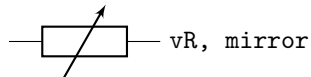
```
\begin{circuitikz}
  \draw (0, 0) to [R, fill=black] (2, 0);
\end{circuitikz}
```



R, american resistor

```
\begin{circuitikz}
  \draw (0, 0) to [R, american resistor] (2, 0);
\end{circuitikz}
```

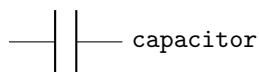
■Tips 素子を（銅線に関して）反転させる場合は mirror を使う.



vR, mirror

```
\begin{circuitikz}
  \draw (0, 0) to [vR, mirror] (2, 0);
\end{circuitikz}
```

2.3 コンデンサー



capacitor

```
\begin{circuitikz}
  \draw (0, 0) to [capacitor] (1.5, 0);
\end{circuitikz}
```

—{ }— wavy capacitor

```
\begin{circuitikz}
  \draw (0, 0) to [wavy capacitor] (1.5, 0);
\end{circuitikz}
```

—/— variable capacitor

```
\begin{circuitikz}
  \draw (0, 0) to [variable capacitor] (1.5, 0);
\end{circuitikz}
```

—|—

capacitor, \Cwidth=0.4

```
\begin{circuitikz}
  \draw (0, 0) to [capacitor, \Cwidth=0.4] (1.5,
    0);
\end{circuitikz}
```

■Tips コンデンサーの電荷等を描く場合は次のようにする.

$-Q$ | C | $+Q$

```
\begin{circuitikz}
  \draw (0, 0) to [capacitor, \Cwidth=0.4, name=capa] (2, 0);
  \draw (capa.center) node {$C$};
  \draw (capa.north east) node [right] {$+Q$};
  \draw (capa.north west) node [left] {$-Q$};
\end{circuitikz}
```

容量だけの場合は,

```
\drawCapa*{ 始点 }{ 終点 }{ 容量 }
```

—| C_1 —

```
\begin{circuitikz}
  \drawCapa*{(0, 0)}{(2, 0)}{$C_1$};
\end{circuitikz}
```

コンデンサーの容量・電荷を両方描く場合は,

```
\drawCapa[!]{ 始点 }{ 終点 }{ 容量 }{ 電荷 }
```

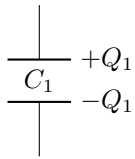
銅線が横の場合に, 右側の極板を + にするには [r] (省略可), 左側の極板を + にするには [l]. 銅線が縦の場合に, 上側の極板を + にするには [u], 下側の極板を + にするには [d]. **終点は終点より右・上に配置すること!**

$-Q_1$ | C_1 | $+Q_1$

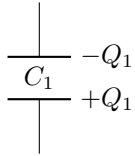
```
\begin{circuitikz}
  \drawCapa{(0, 0)}{(2, 0)}{$C_1$}{$Q_1$};
\end{circuitikz}
```

$+Q_1$ | C_1 | $-Q_1$

```
\begin{circuitikz}
  \drawCapa[l]{(0, 0)}{(2, 0)}{$C_1$}{$Q_1$};
\end{circuitikz}
```

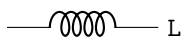


```
\begin{circuitikz}
  \drawCapa[u]{(0, 0)}{(0, 2)}{C_1}{Q_1};
\end{circuitikz}
```



```
\begin{circuitikz}
  \drawCapa[d]{(0, 0)}{(0, 2)}{C_1}{Q_1};
\end{circuitikz}
```

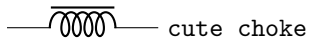
2.4 コイル



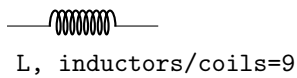
```
\begin{circuitikz}
  \draw (0, 0) to [L] (2, 0);
\end{circuitikz}
```



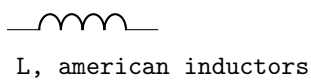
```
\begin{circuitikz}
  \draw (0, 0) to [vL] (2, 0);
\end{circuitikz}
```



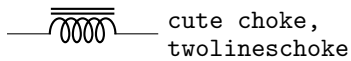
```
\begin{circuitikz}
  \draw (0, 0) to [cute choke] (2, 0);
\end{circuitikz}
```



```
\begin{circuitikz}
  \draw (0, 0) to [L, inductors/coils=9] (2, 0);
\end{circuitikz}
```

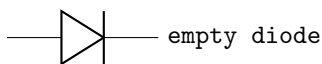


```
\begin{circuitikz}
  \draw (0, 0) to [L, american inductors] (2, 0);
\end{circuitikz}
```

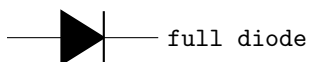


```
\begin{circuitikz}
  \draw (0, 0) to [cute choke, twolineschoke] (2, 0);
\end{circuitikz}
```

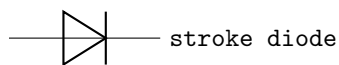
2.5 ダイオード



```
\begin{circuitikz}
  \draw (0, 0) to [empty diode] (2, 0);
\end{circuitikz}
```

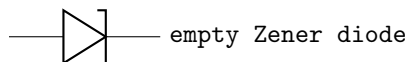


```
\begin{circuitikz}
  \draw (0, 0) to [full diode] (2, 0);
\end{circuitikz}
```



stroke diode

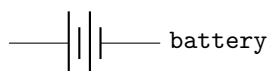
```
\begin{circuitikz}
  \draw (0, 0) to [stroke diode] (2, 0);
\end{circuitikz}
```



empty Zener diode

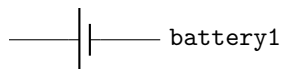
```
\begin{circuitikz}
  \draw (0, 0) to [empty Zener diode] (2, 0);
\end{circuitikz}
```

2.6 電源



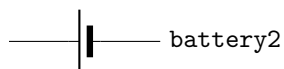
battery

```
\begin{circuitikz}
  \draw (0, 0) to [battery] (2, 0);
\end{circuitikz}
```



battery1

```
\begin{circuitikz}
  \draw (0, 0) to [battery1] (2, 0);
\end{circuitikz}
```



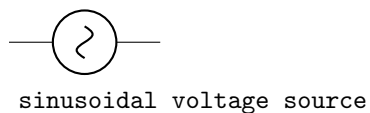
battery2

```
\begin{circuitikz}
  \draw (0, 0) to [battery2] (2, 0);
\end{circuitikz}
```



ACV

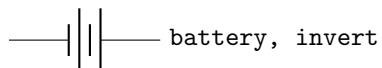
```
\begin{circuitikz}
  \draw (0, 0) to [ACV] (2, 0);
\end{circuitikz}
```



sinusoidal voltage source

```
\begin{circuitikz}
  \draw (0, 0) to [sinusoidal voltage source] (2, 0);
\end{circuitikz}
```

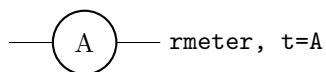
■Tips 逆向きに描画したい場合は始点と終点を入れ替えるか, `invert` を使用する.



battery, invert

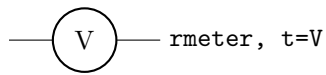
```
\begin{circuitikz}
  \draw (0, 0) to [battery, invert] (2, 0);
\end{circuitikz}
```

2.7 計器

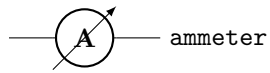


rmeter, t=A

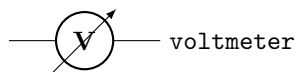
```
\begin{circuitikz}
  \draw (0, 0) to [rmeter, t=A] (2, 0);
\end{circuitikz}
```



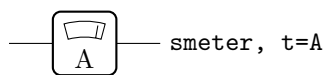
```
\begin{circuitikz}
  \draw (0, 0) to [rmeter, t=V] (2, 0);
\end{circuitikz}
```



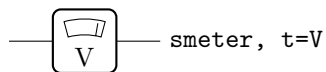
```
\begin{circuitikz}
  \draw (0, 0) to [ammeter] (2, 0);
\end{circuitikz}
```



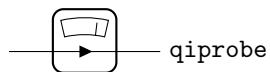
```
\begin{circuitikz}
  \draw (0, 0) to [voltmeter] (2, 0);
\end{circuitikz}
```



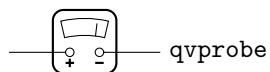
```
\begin{circuitikz}
  \draw (0, 0) to [smeter, t=A] (2, 0);
\end{circuitikz}
```



```
\begin{circuitikz}
  \draw (0, 0) to [smeter, t=V] (2, 0);
\end{circuitikz}
```

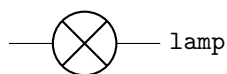


```
\begin{circuitikz}
  \draw (0, 0) to [qprobe] (2, 0);
\end{circuitikz}
```

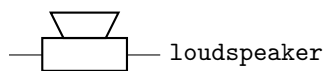


```
\begin{circuitikz}
  \draw (0, 0) to [qvprobe] (2, 0);
\end{circuitikz}
```

2.8 その他

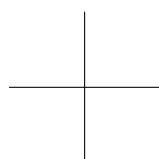


```
\begin{circuitikz}
  \draw (0, 0) to [lamp] (2, 0);
\end{circuitikz}
```

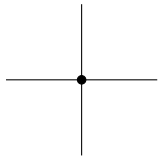


```
\begin{circuitikz}
  \draw (0, 0) to [loudspeaker] (2, 0)
\end{circuitikz}
```

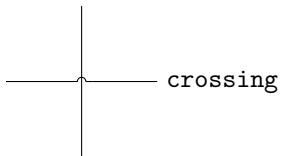
2.9 交差



```
\begin{circuitikz}
  \draw (-1, 0) to (1, 0);
  \draw (0, 1) to (0, -1);
\end{circuitikz}
```



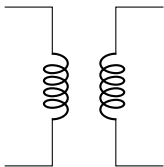
```
\begin{circuitikz}
  \draw (-1, 0) to (1, 0);
  \draw (0, 1) to (0, -1);
  \draw (0, 0) node [circ] {};
\end{circuitikz}
```



```
\begin{circuitikz}
  \draw (-1, 0) to [crossing] (1, 0);
  \draw (0, 1) to (0, -1);
\end{circuitikz}
```

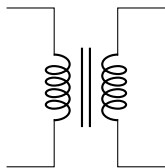
2.10 変圧器

node のオプションにする.



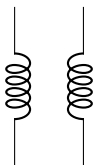
transformer

```
\begin{circuitikz}
  \draw (0, 0) node [transformer] {};
\end{circuitikz}
```



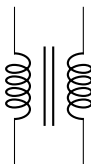
transformer core

```
\begin{circuitikz}
  \draw (0, 0) node [transformer core] {};
\end{circuitikz}
```



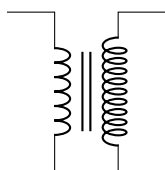
transformerNL

```
\begin{circuitikz}
  \draw (0, 0) node [transformerNL] {};
\end{circuitikz}
```



transformerNL core

```
\begin{circuitikz}
  \draw (0, 0) node [transformerNL core] {};
\end{circuitikz}
```

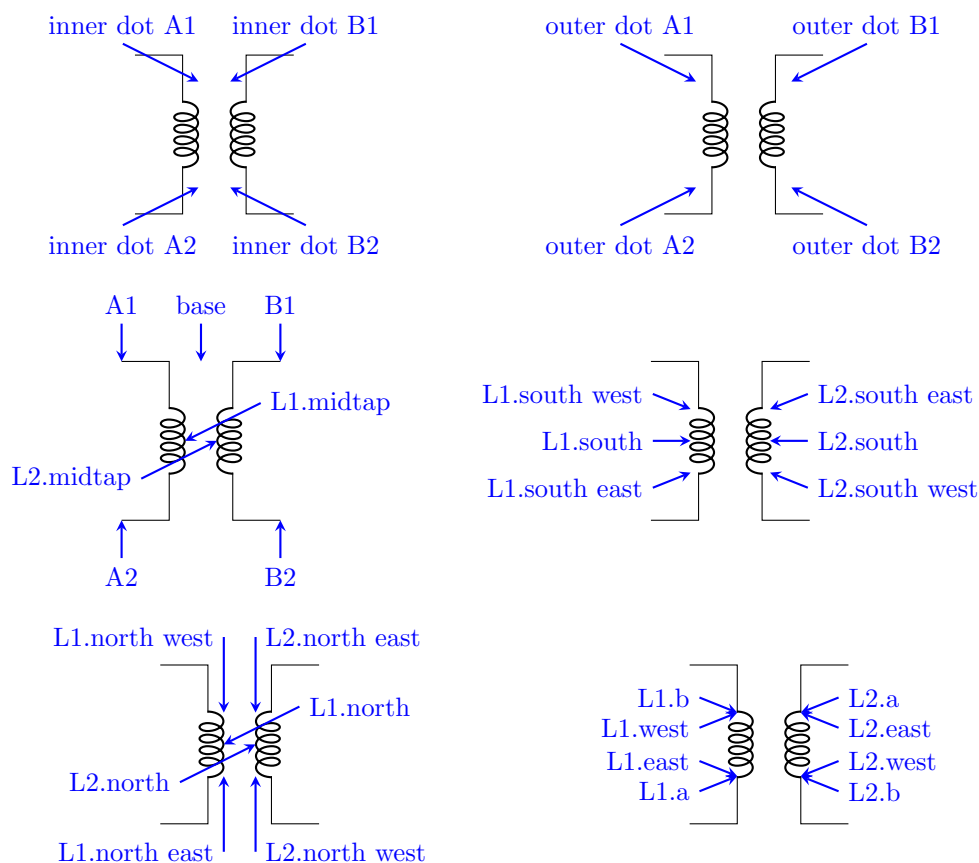


```


\begin{circuitikz}
  \ctikzset{transformer L1/.style={american inductors,
    inductors/coils=6, inductors/width=0.8}}
  \ctikzset{transformer L2/.style={inductors/coils=10,
    inductors/width=1.0}}
  \draw (0, 0) node [transformer core] {};
\end{circuitikz}

```

■Tips 変圧器のアンカーは以下の通り.




2.11 スイッチ

—  — opening switch

```

\begin{circuitikz}
  \draw (0, 0) to [opening switch] (2, 0);
\end{circuitikz}

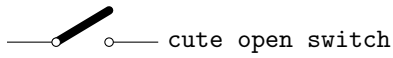
```

—  — closing switch

```

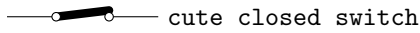
\begin{circuitikz}
  \draw (0, 0) to [closing switch] (2, 0);
\end{circuitikz}

```



cute open switch

```
\begin{circuitikz}
  \draw (0, 0) to [cute open switch] (2, 0);
\end{circuitikz}
```



cute closed switch

```
\begin{circuitikz}
  \draw (0, 0) to [cute closed switch] (2, 0);
\end{circuitikz}
```



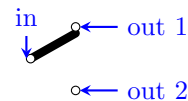
cute opening switch

```
\begin{circuitikz}
  \draw (0, 0) to [cute opening switch] (2, 0);
\end{circuitikz}
```



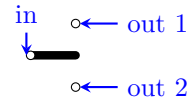
cute closing switch

```
\begin{circuitikz}
  \draw (0, 0) to [cute closing switch] (2, 0);
\end{circuitikz}
```



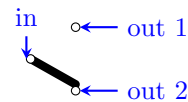
cute spdt up

```
\begin{circuitikz}
  \draw (0, 0) node [cute spdt up] {};
\end{circuitikz}
```



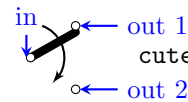
cute spdt mid

```
\begin{circuitikz}
  \draw (0, 0) node [cute spdt mid] {};
\end{circuitikz}
```



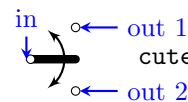
cute spdt down

```
\begin{circuitikz}
  \draw (0, 0) node [cute spdt down] {};
\end{circuitikz}
```



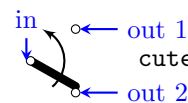
cute spdt up arrow

```
\begin{circuitikz}
  \draw (0, 0) node [cute spdt up arrow] {};
\end{circuitikz}
```



cute spdt mid arrow

```
\begin{circuitikz}
  \draw (0, 0) node [cute spdt mid arrow] {};
\end{circuitikz}
```

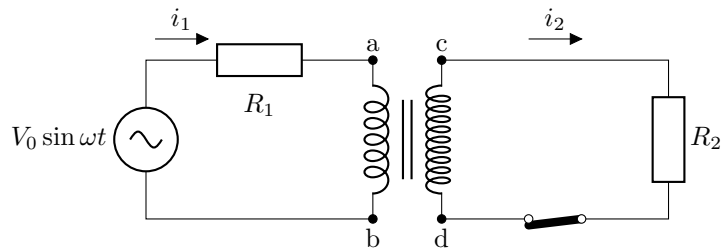


cute spdt down arrow

```
\begin{circuitikz}
  \draw (0, 0) node [cute spdt down arrow] {};
\end{circuitikz}
```

3 サンプル

3.1 トランス回路

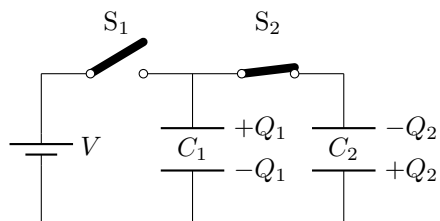


```

\begin{circuitikz}
  \ctikzset{transformer L1/.style={inductors/coils=6, inductors/width=1.0}}
  \ctikzset{transformer L2/.style={inductors/coils=10, inductors/width=1.0}}
  \draw (0, 0) node [transformerNL core, name=trans] {};
  \coordinate (UL) at ($ (trans.A1) + (-3, 0) $);
  \coordinate (DL) at ($ (trans.A2) + (-3, 0) $);
  \coordinate (UR) at ($ (trans.B1) + (3, 0) $);
  \coordinate (DR) at ($ (trans.B2) + (3, 0) $);
  \draw (trans.A1) to [R, l^=$R_1$, f_<=$i_1$, *-] (UL) to [sinusoidal voltage source,
    l_=$V_0\sin\omega t$] (DL) to [short, -*] (trans.A2);
  \draw (trans.B1) to [short, f>=$i_2$, *-] (UR) to [R, l=$R_2$] (DR) to [cute closed
    switch, -*] (trans.B2);
  \draw (trans.A1) node [above] {a};
  \draw (trans.A2) node [below] {b};
  \draw (trans.B1) node [above] {c};
  \draw (trans.B2) node [below] {d};
\end{circuitikz}

```

3.2 コンデンサー回路 1

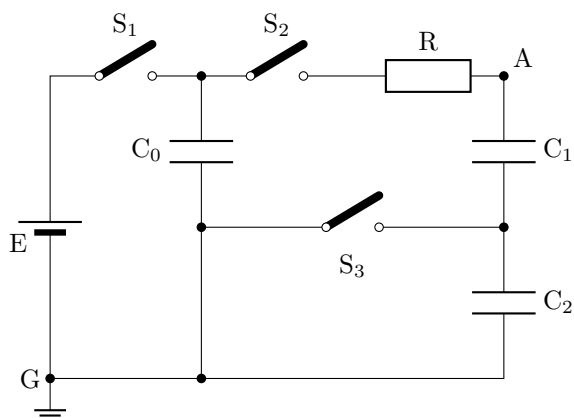


```

\begin{circuitikz}
  \draw (0, 0) to [battery1, l=$V$] (0, -2) to [short] (4, -2);
  \draw (0, 0) to [cute open switch=$S_1$] (2,0) to [cute closed switch=$S_2$] (4,0);
  \drawCapa[u]{(2, -2)}{(2, 0)}{C_1}{Q_1$}
  \drawCapa[d]{(4, -2)}{(4, 0)}{C_2}{Q_2$}
\end{circuitikz}

```

3.3 コンデンサー回路 2

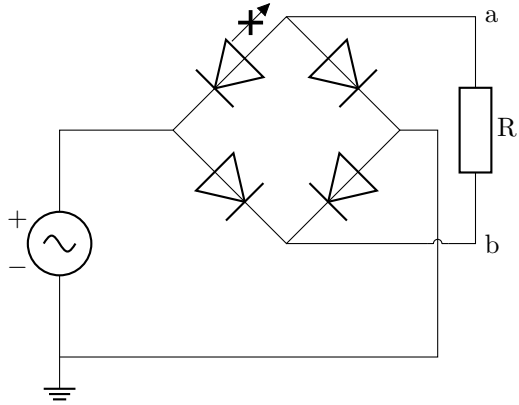


```

\begin{circuitikz}
  \draw (0, 0) node [ground] {} node [left] {G} to [battery2, name=battery, invert, *-]
    (0, 4) to [cute open switch, l=$S_1$, -*] (2, 4) to [cute open switch, l=$S_2$]
    (4, 4) to [R, l=R, -*] (6, 4) node [above right] {A} to [capacitor, l=$C_1$, -*]
    (6, 2) to [capacitor, l=$C_2$] (6, 0) to [short, -*] (2, 0) to (0, 0);
  \draw (2, 0) to [short, -*] (2, 2) to [capacitor, l^=$C_0$] (2, 4);
  \draw (2, 2) to [cute open switch, l_=$S_3$] (6, 2);
  \draw (battery.north east) node {E};
\end{circuitikz}

```

3.4 ダイオード回路



```

\begin{circuitikz}[american voltages]
  \draw (0, 0) node [ground] {} to [sinusoidal voltage source, v^<={\null}] (0, 3) to
    (1.5, 3);
  \draw (1.5, 3) to [stroke diode, invert, xf=\relax] (3, 4.5) to [stroke diode] (4.5,
    3) to [stroke diode] (3, 1.5) to [stroke diode, invert] (1.5, 3);
  \draw (4.5, 3) to (5, 3) to (5, 0) to (0, 0);
  \draw (3, 1.5) to (4.5, 1.5) to [crossing] (5.5, 1.5) node [right] {b} to [R, l_=R]
    (5.5, 4.5) node [right] {a} to (3, 4.5);
\end{circuitikz}

```

4 参考

素子等は以下のファイルで定義される．新しい素子を作る際の参考に，`kpsewhich` で開ける．

- `ctikzstyle-example.tex`
- `pgfcircflow.tex`
- `pgfcircshapes.tex`
- `ctikzstyle-legacy.tex`
- `pgfcirclabel.tex`
- `pgfcirctripoles.tex`
- `ctikzstyle-romano.tex`
- `pgfcircmonopoles.tex`
- `pgfcircutils.tex`
- `pgfcirc.defines.tex`
- `pgfcircmultipoles.tex`
- `pgfcircvoltage.tex`
- `pgfcircbipoles.tex`
- `pgfcircpath.tex`
- `pgfcirccurrent.tex`
- `pgfcircquadpoles.tex`