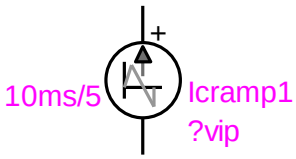
Complex ramp current source device



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1 Available versions

The “I complex ramp” device accepts both 1-phase (general) and 3-phase signals. The 3-phase version is the equivalent of 3 decoupled sources (one for each phase).

1.1 When changing phases

- When the device is in its 1-phase state and its signal is changed to 3-phase, but the device is not double-clicked, balanced conditions are assumed and the 3 sources become identical to the 1-phase (phase-A) version. The Netlist is generated for the 3-phase version.
- When the device is in its 3-phase state and its signal is changed to 1-phase, but the device is not double-clicked, phase-A quantities are automatically retained for the 1-phase version. The Netlist is generated for the 1-phase version.

1.2 The generic version of “I complex ramp”

1.2.1 Parameters

The generic version of “I complex ramp” has two pins.

The model parameters corresponding to the current source function picture shown on the first data tab are:

- t_{start} start time, if $t < t_{start}$ the source is shorted.
- t_0 rise time to I_{m0} (first slope)
- I_{m0} maximum current of the first ramp.
- t_1 time-point for I_{m1}.
- I_{m1} Current point for specifying the second slope.
- t_{stop} stop time, if $t > t_{stop}$ the source is an open-circuit. The stop time must be greater than the start time.

An example of simulated source voltage is given in Figure 1 for:

$t_{start} = 5ms$

$t_0 = 10ms$

$I_{m0} = 5V$

$t_1 = 15ms$

$I_{m1} = -2V$

$t_{stop} = 30ms$

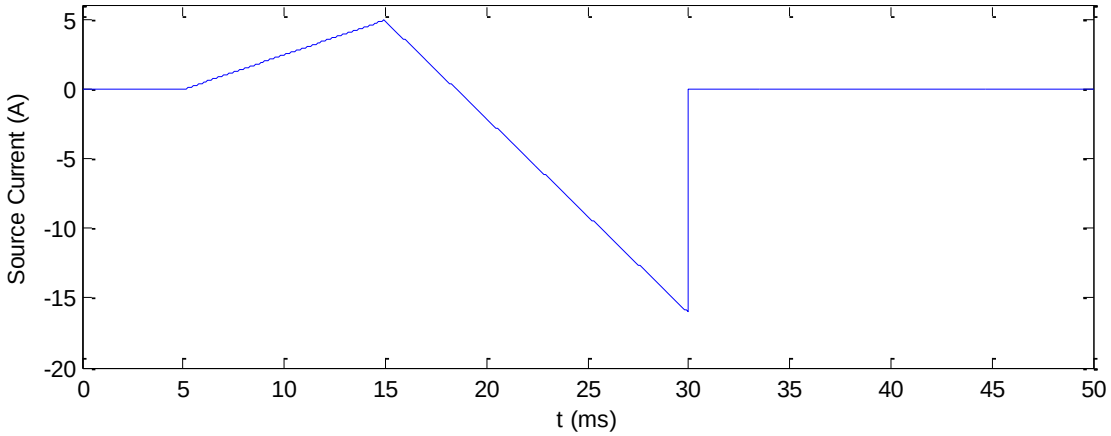

Figure 1 Sample waveform

1.2.2 Netlist format

```
_Icramp;Icramp1;2;2;s41,s42,
0,1ms,5,5ms,-2,10ms,?v,?i,?p,
```

Field	Description
_Icramp	Part name
Icramp1	Instance name, any name.
2	Total number of pins
2	Number of pins given in this data section
s1	Signal name connected to k-pin (positive), any name
s2	Signal name connected to m-pin, any name
t_{start}	Start time.
t_0	Rise time t_0
I_{m0}	Maximum current of first ramp
t_1	Time-point for I_{m1}.
I_{m1}	Current point used to specify the second slope
t_{stop}	Stop time.
?v	Request for voltage scope, sent to scope group vb (branch voltages), optional
?i	Request for current scope, sent to scope group ib (branch currents), optional
?p	Request for power scope, sent to scope group p (branch power), optional

The m-pin of this device can be deleted to create an automatic ground connection.

An example of Netlist for the 3-phase version is given by:

```
_Icramp;Icramp1a;2;2;s41a,s42a,
0,1ms,5,5ms,-2,10ms,?v,
```

```
_Icramp;Icramp1b;2;2;s41b,s42b,
0,1ms,5,5ms,-2,10ms,?v,?i,
_Icramp;Icramp1c;2;2;s41c,s42c,
0,1ms,5,5ms,-2,10ms,?v,?i,?p,
```

EMTPWorks automatically generates 3 separate (decoupled) sources, one per phase. The phase identification character (a, b or c) is automatically appended to the device instance name and signals.

2 Steady-state model

The steady-state model of this device is an open-circuit.

3 Frequency Scan model

The frequency scan model of this device is an open-circuit.

4 Time-domain model

The device is evaluated at each simulation time-point according to its function.
The source is active (not an open-circuit) for $t_{start} \leq t \leq t_{stop}$.