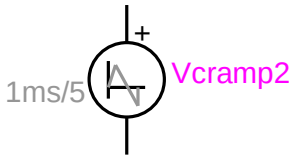
Complex ramp voltage source device



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1 Available versions

The “V 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 “V complex ramp”

1.2.1 Parameters

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

The model parameters corresponding to the voltage 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 V_{m0} (first slope)
- V_{m0} maximum voltage of the first ramp.
- t_1 time-point for V_{m1}.
- V_{m1} Voltage point for specifying the second slope.
- t_{stop} stop time, if $t > t_{stop}$ the source is shorted. The stop time must be greater than the start time

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

$t_{start} = 5ms$

$t_0 = 10ms$

$V_{m0} = 5V$

$t_1 = 15ms$

$V_{m1} = -2V$

$t_{stop} = 30ms$

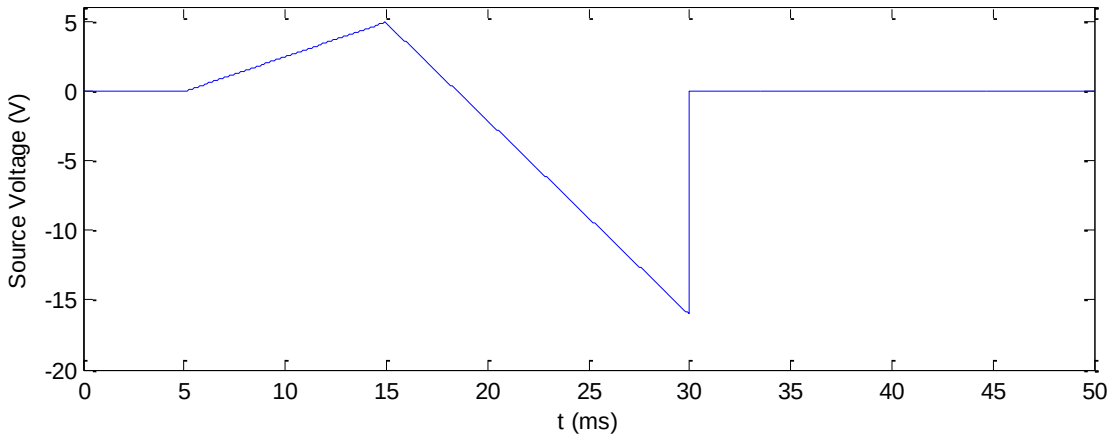

Figure 1 Sample waveform

1.2.2 Netlist format

```
_Vcramp;Vcramp1;2;2;s41,s42,
0,1ms,5,5ms,-2,10ms,?v,?i,?p,
```

Field	Description
_Vcramp	Part name
Vcramp1	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, any name
s2	Signal name connected to m-pin, any name
t_{start}	Start time
t_0	Rise time t_0
V_{m0}	Maximum voltage of first ramp
t_1	Time-point for V_{m1}.
V_{m1}	Voltage 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 ivs (voltage source 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:

```
_Vcramp;Vcramp1a;2;2;s41a,s42a,
0,1ms,5,5ms,-2,10ms,?v,
```

```
_Vcramp;Vcramp1b;2;2;s41b,s42b,
0,1ms,5,5ms,-2,10ms,?v,?i,
_Vcramp;Vcramp1c;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 a short-circuit.

3 Frequency Scan model

The frequency scan model of this device is a short-circuit.

4 Time-domain model

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