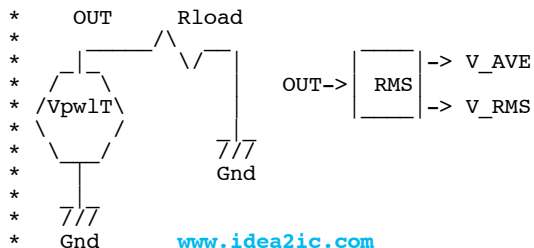


# PWL\_Noise\_RMS



www.idea2ic.com  
dsauersanjose@aol.com 4/23/08

```
* VpwlT OUT 0 PWL( <== Format for piecewise linear file is as so.
* + 0 0.38156547 Random Noise can by a javascript calculator.
* + 1.00E-06 0.60066694 The step of time is 0.5ms and bandwidth
* + 2.00E-06 0.361341313 of noise will therefore be a a 1kHz.
* .....etc.....
* + 0.000003 0.944365605 The total measurement time is 500ms which
* + 5.16E-04 0.658730205 corresponds to a 2Hz resolution
* + )
```

This text file is located at the following

**Users/donsauer/Documents/MacSpice/PWL\_test.txt**

```
* spec start_f stop_f step_f vector [vector ...]
* spec 2 2k 2 v(out) spec 2Hz->2kHz @ 2Hz steps
* .tran TSTEP TSTOP TSTART TMAX ?UIC?
```

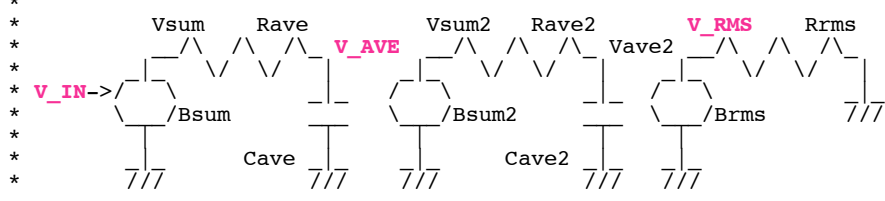
```
Rload OUT 0 1k
.include PWL_test.txt
XM_RMS OUT V_AVE V_RMS M_RMS
.tran 50u 500m 0 500m UIC
```

**\*====How Well Can A PWL Simulate Noise?=====**

**\*====First Create The Data For The PWL File=====**  
**\* <http://www.idea2ic.com/PlayWithJavascript/RandomPWL2.html>**

```
.control
*====Run And Use A RMS Meter To Monitor It=====
run
plot OUT V_AVE V_RMS ylimit -3 +3
*====Find Its Spectrum=====
linearize
set specwindow = "rectangular"
spec 2 2k 2 v(OUT)
plot mag(v(OUT)) loglog
.endc
```

**\* ===== .SUBCKT M\_RMS V\_IN V\_AVE V\_RMS =====**



**.SUBCKT M\_RMS V\_IN V\_AVE V\_RMS**

```

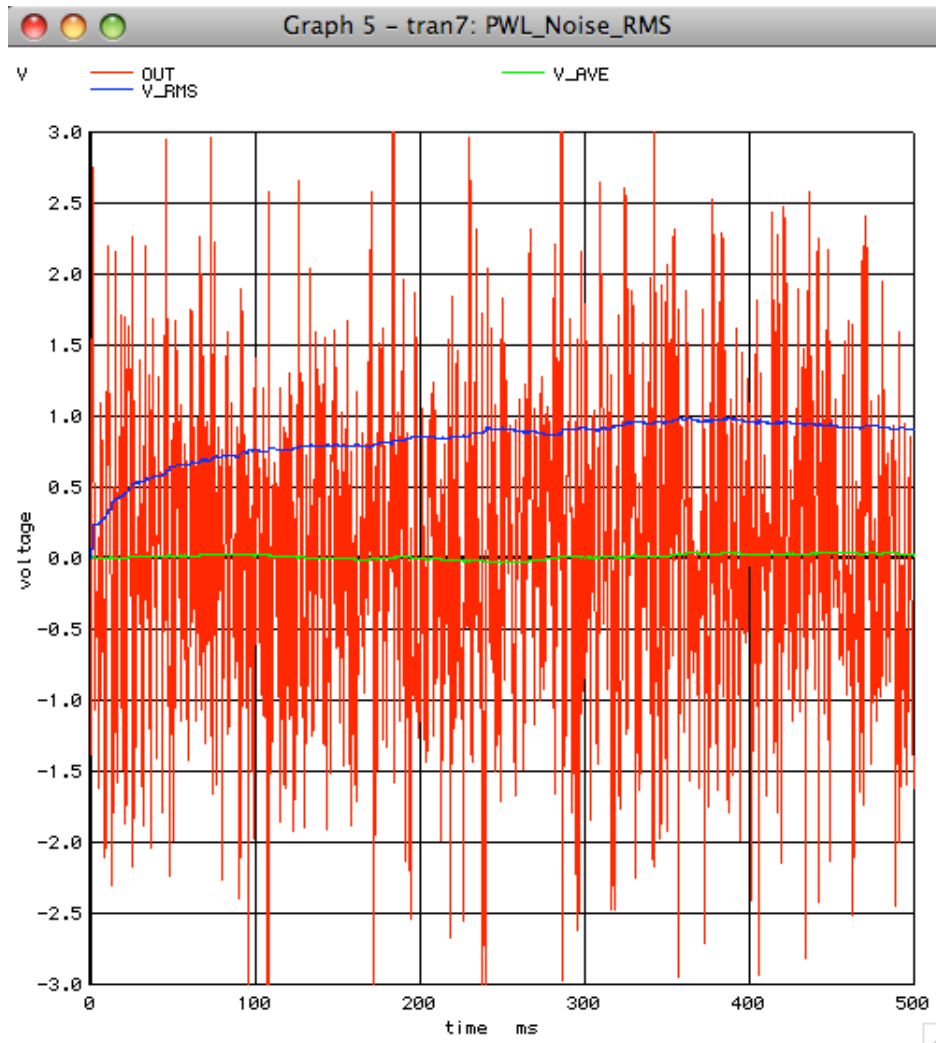
Bsum      Vsum      0      V = v(V_IN)
Rave       Vsum      V_AVE    1
Cave       V_AVE    0      300m
Bsum2    Vsum2     0      V = (v(V_IN)-v(V_AVE))^2
Rave2     Vsum2     Vave2   1
Cave2     Vave2    0      100m
Brms    V_RMS    0      V = v(Vave2)^0.5
Rrms      V_RMS    V0      1k
.ENDS   M_RMS

```

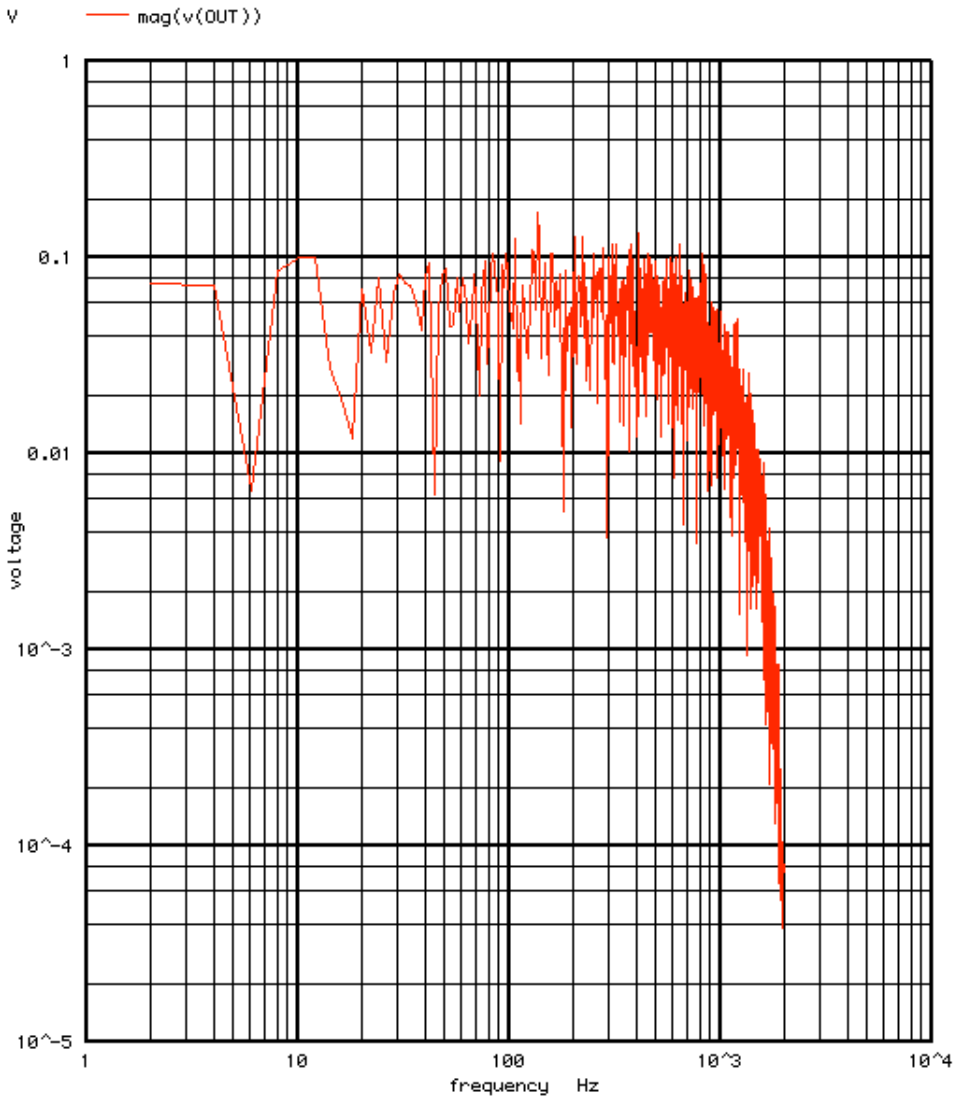
**.end**

=====END\_OF\_SPICE=====

The total sample period is 200msec(2Hz)  
 A noise signal with 1Vrms was generated.  
 That corresponds to a 6Vppk signal.



Each sample point is 0.5msec apart (1KHz)  
 The transient is run at 50uec(10kHz) rate  
 The output is interpolated rather than sinc functions.  
 Harmonics (not Shown)are present in the spectrum.



2

1\_Vrms Noise spread our over 500 Bins is reduced by a factor of  $1/\sqrt{500} = 63\text{mV\_peak}$  Each bin has a 2Hz bandwidth. Nyquist(-3db) is at 1KHz Sample period is 500mS (2Hz)

The spectrum appears to be in V\_peak format.

The link to the javascript PWL generator

\* <http://www.idea2ic.com/PlayWithJavascript/RandomPWL2.html>

