

1

```

clear
<in echo

.opt out=80

.model n nmos level=1 kp=20u vto=-1 lambda=.01 cgdo=2e-10 cgso=2e-10 tox=50e-9
.model p pmos level=1 kp=5u vto=-1 lambda=.01 cgdo=2e-10 cgso=2e-10 tox=50e-9

m4 1 9 10 2 n w=625u l=10u
i1 10 2 dc .01
vdd 1 0 dc 15
ves 2 0 dc -15
vg 9 0 dc 5
*.list
.pr op v nodes i(m*) z(10) gds(m*)
.op
# v(1) v(2) v(9) v(10) i(M4) z(10)
+ gds(M4)
300.15 15. -15. 5. 0.26556 0.0099992 183.66
+ 87.168u

.del i1
m10 10 8 2 2 n w=10000u l=10u
m7 8 8 2 2 n w=10u l=10u
iref 1 8 dc 10u
*.list
.pr op v nodes i(m*) z(10) gds(m*)
.op
# v(1) v(2) v(8) v(9) v(10) i(M4) z(10)
+ i(M10) i(M7) gds(M4) gds(M10) gds(M7)
300.15 15. -15. -13.01 5. 0.037528 0.01128
+ 0.011277 9.99999u 169.71 98.136u 98.068u 98.058u

.del iref
rref 1 8 2.8meg
*.list
.pr op v nodes i(m*) z(10) gds(m*)
.op
# v(1) v(2) v(8) v(9) v(10) i(M4) z(10)
+ i(M10) i(M7) gds(M4) gds(M10) gds(M7)
300.15 15. -15. -13.01 5. 0.036894 0.011284
+ 0.011282 10.003u 169.67 98.169u 98.099u 98.099u

.del vg
m3 9 6 1 1 p w=400u l=10u
vg 6 1 dc -2.044
ib 9 2 dc 100u
rb 9 2 1meg
*.list
.pr op v nodes i(m*) z(10)
.op
# v(1) v(2) v(6) v(8) v(9) v(10)
+ i(M4) i(M10) i(M7) i(M3) z(10)
300.15 15. -15. 12.956 -13.01 4.9465 -0.014695
+ 0.011278 0.011279 10.003u -119.95u 169.69

.del ib rb
m9 9 8 2 2 n w=100u l=10u
*.list
.pr op v nodes i(m*) z(10)
.op
# v(1) v(2) v(6) v(8) v(9) v(10)
+ i(M4) i(M10) i(M7) i(M3) i(M9) z(10)
300.15 15. -15. 12.956 -13.01 6.0545 1.0562
+ 0.011383 0.011384 10.003u -118.74u 118.74u 169.62

.del vg
vg 6 1 dc -2.034
.op
# v(1) v(2) v(6) v(8) v(9) v(10)
+ i(M4) i(M10) i(M7) i(M3) i(M9) z(10)
300.15 15. -15. 12.966 -13.01 4.9502 -0.011118
+ 0.011278 0.011279 10.003u -117.66u 117.66u 169.66

.del vg
i5 1 5 dc 5u
i6 1 6 dc 5u
i8 7 2 dc 10u
r5 1 5 20meg
r6 1 6 20meg
r8 7 2 67.85meg
m1 5 3 7 2 n w=100u l=10u
m2 6 4 7 2 n w=100u l=10u

r1 3 0 10k
r2 4 0 10k

.opt dampmax=.5

.pr op v nodes
.op
# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.966 12.966
+-1.2214 -13.01 4.9115 -0.048497
.pr op i(m*)
.op
# i(M4) i(M10) i(M7) i(M3) i(M9) i(M1)
+ i(M2)
300.15 0.011275 0.011276 10.003u -117.62u 117.62u 5.101u
+ 5.101u
*.pr op i(r*) iter(0)
*.op

.del r8 i8
m8 7 8 2 2 n w=9.142 l=10
**m8 7 8 2 2 n w=9.179 l=10
.pr op v nodes
.op
# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.966 12.966
+-1.2114 -13.01 4.9038 -0.055982
.pr op i(m*)
.op
# i(M4) i(M10) i(M7) i(M3) i(M9) i(M1)
+ i(M2) i(M8)
300.15 0.011274 0.011275 10.003u -117.61u 117.61u 5.1006u

```

```

+ 5.1006u 10.202u
**.pr op i(r*) iter(0)
**.op

.del r5 r6 i5 i6
m5 5 5 1 1 p w=20.35u l=10u
m6 6 5 1 1 p w=20.35u l=10u
.del m8
m8 7 8 2 2 n w=10 l=10
.pr op v nodes
.op
# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.036555
.pr op i(m*)
.op
# i(M4) i(M5) i(M10) i(M7) i(M3) i(M9) i(M1)
+ i(M2) i(M8)
300.15 0.011283 0.011284 10.003u -117.71u 117.71u 5.5793u
+ 5.5794u -5.5799u -5.5801u 11.158u
.pr op i(r*) iter(0)
.op
# i(Rref) i(R1) i(R2) iter(0)
300.15 10.003u 0. 0. 41.

rload 10 0 2k
.pr op v nodes
.op
# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.033722
.pr op i(m*)
.op
# i(M4) i(M5) i(M10) i(M7) i(M3) i(M9) i(M1)
+ i(M2) i(M8)
300.15 0.0113 0.011284 10.003u -117.71u 117.71u 5.5793u
+ 5.5794u -5.5799u -5.5801u 11.158u
.pr op i(r*) iter(0)
.op
# i(Rref) i(R1) i(R2) i(Rload) iter(0)
300.15 10.003u 0. 0. 16.861u 37.

*** uncompensated frequency response
v2 4 0 generator
.print ac v(10) vdb(10) vp(10)
.ac 1 10g dec
#Freq v(10) vdb(10) vp(10)
1. 43.449p -207.24 90.012
10. 434.77p -187.23 90.107
100. 4.3688n -167.19 90.089
1.K 43.707n -147.19 90.008
10.K 437.08n -127.19 89.986
100.K 4.3707u -107.19 89.851
1.Meg 43.693u -87.192 88.508
10.Meg 422.95u -67.474 75.398
100.Meg 0.0015662 -56.103 21.011
1.G 0.0016781 -55.504 2.2343
10.G 0.0016799 -55.494 0.22523
.ac 10meg 100meg 10meg
#Freq v(10) vdb(10) vp(10)
10.Meg 422.95u -67.474 75.398
20.Meg 775.21u -62.212 62.479
30.Meg 0.0010331 -59.717 51.991
40.Meg 0.0012104 -58.341 43.822
50.Meg 0.0013307 -57.518 37.517
60.Meg 0.0014131 -56.996 32.614
70.Meg 0.0014709 -56.648 28.745
80.Meg 0.0015125 -56.406 25.641
90.Meg 0.0015431 -56.232 23.108
100.Meg 0.0015662 -56.103 21.011
.ac 10meg 20meg 1meg
#Freq v(10) vdb(10) vp(10)
10.Meg 422.95u -67.474 75.398
11.Meg 462.18u -66.704 74.009
12.Meg 500.59u -66.01 72.639
13.Meg 538.17u -65.382 71.29
14.Meg 574.86u -64.809 69.961
15.Meg 610.63u -64.284 68.655
16.Meg 645.48u -63.802 67.372
17.Meg 679.37u -63.358 66.112
18.Meg 712.29u -62.947 64.876
19.Meg 744.24u -62.566 63.665
20.Meg 775.21u -62.212 62.479

*** find value of compensating capacitor
ccomp 6 9 100p
.pr op v nodes
.op
# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.033722
.ac 1 10g dec 2
#Freq v(10) vdb(10) vp(10)
1. 39.75K 91.987 -34.299
3.1623 20.238K 86.123 -65.128
10. 6.9794K 76.876 -81.661
31.623 2.2283K 66.959 -87.35
100. 705.33 56.968 -89.173
316.23 223.07 46.969 -89.776
1.K 70.545 36.969 -90.048
3.1623K 22.321 26.974 -90.403
10.K 7.0752 16.995 -91.494
31.623K 2.2482 7.0367 -95.058
100.K 0.73492 -2.6752 -105.82
316.23K 0.29737 -10.534 -132.4
1.Meg 0.20764 -13.654 -164.13
3.1623Meg 0.19292 -14.292 173.92
10.Meg 0.16436 -15.684 145.84
31.623Meg 0.085072 -21.404 105.98
100.Meg 0.026835 -31.426 68.681
316.23Meg 0.0073535 -42.67 35.519
1.G 0.0040318 -47.89 14.204
3.1623G 0.0036606 -48.729 4.686
10.G 0.0036229 -48.819 1.4914

.modify ccomp=10p

```

```
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.033722
.ac 1 10g dec 2
#Ffreq v(10) vdb(10) vp(10)
1. 48.004K 93.626 -3.9364
3.1623 47.017K 93.445 -12.276
10. 39.639K 91.963 -34.532
31.623 20.093K 86.061 -65.318
100. 6.9199K 76.802 -81.73
316.23 2.2089K 66.884 -87.365
1.K 699.24 56.892 -89.157
3.1623K 221.25 46.898 -89.716
10.K 70.11 36.916 -89.998
31.623K 22.203 26.928 -90.551
100.K 7.0251 16.933 -91.981
316.23K 2.2289 6.9616 -96.333
1.Meg 0.72732 -2.7655 -109.7
3.1623Meg 0.28941 -10.77 -144.32
10.Meg 0.17275 -15.251 162.64
31.623Meg 0.083376 -21.579 110.71
100.Meg 0.025475 -31.786 69.265
316.23Meg 0.0069144 -43.205 35.215
1.G 0.0037695 -48.474 14.062
3.1623G 0.0034201 -49.319 4.6397
10.G 0.0033847 -49.41 1.477
```

```
.modify ccomp=1p
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.033722
.ac 1 10g dec 2
#Ffreq v(10) vdb(10) vp(10)
1. 48.116K 93.646 -0.42854
3.1623 48.104K 93.644 -1.3549
10. 47.983K 93.622 -4.2775
31.623 46.825K 93.41 -13.307
100. 38.531K 91.716 -36.794
316.23 18.737K 85.454 -67.075
1.K 6.3765K 76.092 -82.362
3.1623K 2.0336K 66.165 -87.517
10.K 644.92 56.19 -89.183
31.623K 204.25 46.203 -89.92
100.K 64.603 36.205 -90.602
316.23K 20.424 26.203 -92.178
1.Meg 6.4406 16.179 -96.962
3.1623Meg 1.9826 5.9447 -111.72
10.Meg 0.51485 -5.7664 -151.22
31.623Meg 0.096161 -20.34 142.96
100.Meg 0.019413 -34.238 77.669
316.23Meg 0.0044546 -47.024 35.651
1.G 0.0023516 -52.573 14.014
3.1623G 0.0021258 -53.449 4.6183
10.G 0.002103 -53.543 1.4727
```

```
.modify ccomp=3p
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.033722
.ac 1 10g dec 2
#Ffreq v(10) vdb(10) vp(10)
1. 48.107K 93.644 -1.2093
3.1623 48.01K 93.627 -3.8189
10. 47.08K 93.457 -11.919
31.623 40.02K 92.046 -33.724
100. 20.6K 86.277 -64.65
316.23 7.1288K 77.06 -81.473
1.K 2.277K 67.147 -87.267
3.1623K 721.16 57.161 -89.087
10.K 228.54 47.179 -89.702
31.623K 72.374 37.192 -90.151
100.K 22.892 27.194 -90.887
316.23K 7.2401 17.195 -92.937
1.Meg 2.2917 7.2031 -99.314
3.1623Meg 0.73118 -2.7195 -118.96
10.Meg 0.24443 -12.237 -169.69
31.623Meg 0.082793 -21.64 122.09
100.Meg 0.023422 -32.607 71.137
316.23Meg 0.0060062 -44.428 34.86
1.G 0.003237 -49.797 13.868
3.1623G 0.0029331 -50.654 4.5753
10.G 0.0029023 -50.745 1.4573
```

```
.modify ccomp=7p
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.033722
.ac 1 10g dec 2
#Ffreq v(10) vdb(10) vp(10)
1. 48.061K 93.636 -2.7691
3.1623 47.564K 93.546 -8.6961
10. 43.317K 92.733 -25.812
31.623 26.331K 88.409 -56.823
100. 9.7422K 79.773 -78.317
316.23 3.1392K 69.936 -86.255
1.K 994.68 59.954 -88.801
3.1623K 314.77 49.96 -89.59
10.K 99.743 39.978 -89.916
31.623K 31.587 29.99 -90.391
100.K 9.9925 19.993 -91.51
316.23K 3.1647 10.007 -94.859
1.Meg 1.0157 0.13513 -105.26
3.1623Meg 0.36319 -8.7974 -134.86
10.Meg 0.18173 -14.811 169.56
31.623Meg 0.082889 -21.63 112.92
100.Meg 0.025267 -31.949 69.574
316.23Meg 0.006725 -43.446 35.108
1.G 0.0036574 -48.737 14.01
3.1623G 0.0033174 -49.584 4.6225
10.G 0.0032829 -49.675 1.4717
```

```
.modify ccomp=5p
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.033722
.ac 1 10g dec 2
#Ffreq v(10) vdb(10) vp(10)
1. 48.088K 93.641 -1.9895
3.1623 47.83K 93.594 -6.2689
10. 45.453K 93.151 -19.156
31.623 32.391K 90.208 -47.687
100. 13.311K 82.484 -73.939
316.23 4.3622K 72.794 -84.793
1.K 1.3847K 62.827 -88.333
3.1623K 438.25 52.835 -89.433
10.K 138.88 42.853 -89.838
31.623K 43.979 32.865 -90.279
100.K 13.912 22.868 -91.196
316.23K 4.4023 12.874 -93.884
1.Meg 1.4014 2.9312 -102.26
3.1623Meg 0.47021 -6.5542 -127.29
10.Meg 0.19742 -14.092 177.41
31.623Meg 0.082528 -21.668 115.79
100.Meg 0.024668 -32.157 70.014
316.23Meg 0.0064896 -43.756 34.997
1.G 0.0035189 -49.072 13.953
3.1623G 0.0031907 -49.922 4.6037
10.G 0.0031574 -50.013 1.4659
```

```
.ac 1meg 2meg 100k
#Ffreq v(10) vdb(10) vp(10)
1.Meg 1.4014 2.9312 -102.26
1.1Meg 1.2759 2.1166 -103.48
1.2Meg 1.1716 1.3752 -104.69
1.3Meg 1.0834 0.6956 -105.89
1.4Meg 1.0079 0.068661 -107.1
1.5Meg 0.94268 -0.51273 -108.29
1.6Meg 0.88569 -1.0543 -109.48
1.7Meg 0.83552 -1.5609 -110.67
1.8Meg 0.79102 -2.0362 -111.85
1.9Meg 0.7513 -2.4838 -113.03
2.Meg 0.71563 -2.9062 -114.2
```

```
.modify ccomp=4p
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.033722
.ac 1 10g dec 2
#Ffreq v(10) vdb(10) vp(10)
1. 48.099K 93.643 -1.5995
3.1623 47.931K 93.612 -5.0462
10. 46.344K 93.32 -15.602
31.623 36.068K 91.142 -41.445
100. 16.223K 84.203 -70.295
316.23 5.4146K 74.671 -83.533
1.K 1.7222K 64.722 -87.93
3.1623K 545.19 54.731 -89.301
10.K 172.77 44.749 -89.783
31.623K 54.712 34.762 -90.218
100.K 17.306 24.764 -91.041
316.23K 5.4747 14.767 -93.405
1.Meg 1.7373 4.7975 -100.77
3.1623Meg 0.56727 -4.9242 -123.18
10.Meg 0.21374 -13.402 -176.95
31.623Meg 0.08246 -21.675 118.23
100.Meg 0.024177 -32.332 70.42
316.23Meg 0.0062983 -44.016 34.928
1.G 0.0034069 -49.353 13.914
3.1623G 0.0030883 -50.206 4.5908
10.G 0.003056 -50.297 1.462
```

```
.ac 1meg 2meg 100k
#Ffreq v(10) vdb(10) vp(10)
1.Meg 1.7373 4.7975 -100.77
1.1Meg 1.5806 3.9766 -101.84
1.2Meg 1.4502 3.2284 -102.91
1.3Meg 1.3399 2.5415 -103.98
1.4Meg 1.2455 1.9066 -105.04
1.5Meg 1.1637 1.3168 -106.1
1.6Meg 1.0922 0.76635 -107.16
1.7Meg 1.0293 0.25044 -108.21
1.8Meg 0.97333 -0.23477 -109.26
1.9Meg 0.92336 -0.69257 -110.31
2.Meg 0.87844 -1.1257 -111.36
```

```
.delete rload
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.036555
.ac 1 10g dec 2
#Ffreq v(10) vdb(10) vp(10)
1. 52.176K 94.349 -1.5994
3.1623 51.994K 94.319 -5.0461
10. 50.274K 94.027 -15.601
31.623 39.126K 91.849 -41.444
100. 17.599K 84.91 -70.294
316.23 5.8737K 75.378 -83.532
1.K 1.8682K 65.429 -87.929
3.1623K 591.43 55.438 -89.3
10.K 187.42 45.456 -89.778
31.623K 59.352 35.469 -90.203
100.K 18.774 25.471 -90.991
316.23K 5.9394 15.475 -93.247
1.Meg 1.8859 5.5104 -100.28
3.1623Meg 0.61939 -4.1607 -121.68
10.Meg 0.24313 -12.283 -173.76
31.623Meg 0.10079 -19.932 118.45
100.Meg 0.027821 -31.113 64.785
316.23Meg 0.0064868 -43.759 30.743
1.G 0.0034182 -49.324 12.415
3.1623G 0.0030893 -50.203 4.1106
10.G 0.0030561 -50.297 1.3099
.ac 1meg 2meg 100k
#Ffreq v(10) vdb(10) vp(10)
1.Meg 1.8859 5.5104 -100.28
1.1Meg 1.7161 4.6907 -101.3
```

1.2Meg	1.5747	3.9439	-102.32
1.3Meg	1.4552	3.2584	-103.33
1.4Meg	1.3529	2.6251	-104.35
1.5Meg	1.2643	2.037	-105.36
1.6Meg	1.1869	1.4883	-106.37
1.7Meg	1.1187	0.9743	-107.38
1.8Meg	1.0582	0.49109	-108.38
1.9Meg	1.0041	0.035414	-109.38
2.Meg	0.95549	-0.39551	-110.38

```
**** common mode
v1 3 0 generator
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 0. 12.963 12.966
+-1.2211 -13.01 4.9995 0.036555
.ac 1 10g dec 2
#Freq v(10) vdb(10) vp(10)
1. 0.50745 -5.8921 5.6824
3.1623 0.54107 -5.3349 16.954
10. 0.78738 -2.0763 36.313
31.623 1.5725 3.9321 34.465
100. 2.1778 6.7603 14.593
316.23 2.2907 7.1993 3.0219
1.K 2.2875 7.1872 -4.761
3.1623K 2.1477 6.6396 -18.666
10.K 1.4566 3.2668 -43.78
31.623K 0.61457 -4.2286 -53.747
100.K 0.30435 -10.332 -34.499
316.23K 0.24953 -12.057 -17.667
1.Meg 0.24259 -12.302 -21.419
3.1623Meg 0.23508 -12.576 -54.798
10.Meg 0.1945 -14.222 -135.93
31.623Meg 0.099593 -20.035 132.31
100.Meg 0.028242 -30.982 69.245
316.23Meg 0.0066039 -43.604 32.15
1.G 0.0034813 -49.165 12.858
3.1623G 0.0031465 -50.043 4.2514
10.G 0.0031127 -50.137 1.3578
.ac 1meg 2meg 100k
#Freq v(10) vdb(10) vp(10)
1.Meg 0.24259 -12.302 -21.419
1.1Meg 0.2423 -12.313 -22.802
1.2Meg 0.24202 -12.323 -24.238
1.3Meg 0.24174 -12.333 -25.715
1.4Meg 0.24146 -12.343 -27.222
1.5Meg 0.24118 -12.353 -28.752
1.6Meg 0.24089 -12.364 -30.299
1.7Meg 0.2406 -12.374 -31.859
1.8Meg 0.24029 -12.385 -33.428
1.9Meg 0.23998 -12.397 -35.004
2.Meg 0.23965 -12.408 -36.584
```

```
**** set up as 5 db amplifier, put load back
.del v1
rfb 10 3 10k
rload 10 0 2k
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 83.464u 0. 12.963 12.966
+-1.221 -13.01 4.9618 166.93u
.ac 1 10g dec 2
#Freq v(10) vdb(10) vp(10)
1. 1.9999 6.0203 3.3672u
3.1623 1.9999 6.0203 10.648u
10. 1.9999 6.0203 33.671u
31.623 1.9999 6.0203 106.45u
100. 1.9999 6.0203 335.75u
316.23 2. 6.0204 0.0010343
1.K 2.0002 6.0215 0.0024176
3.1623K 2.0023 6.0305 -0.015752
10.K 2.0105 6.0661 -0.34449
31.623K 2.0158 6.089 -1.7415
100.K 2.0116 6.0709 -5.8376
316.23K 1.9621 5.8545 -18.36
1.Meg 1.6013 4.0894 -52.855
3.1623Meg 0.71139 -2.9578 -113.69
10.Meg 0.21771 -13.242 179.4
31.623Meg 0.079989 -21.939 117.68
100.Meg 0.023526 -32.569 70.894
316.23Meg 0.0062461 -44.088 35.666
1.G 0.0034033 -49.362 14.204
3.1623G 0.003088 -50.207 4.6845
10.G 0.003056 -50.297 1.4917
```

```
**** Mess up sizes
.del m5 m6
m5 5 5 1 1 p w=10u l=10u
m6 6 5 1 1 p w=10u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 950.4u 0. 12.523 12.966
+-1.2208 -13.01 4.9638 0.0019008
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 2. 6.0204 541.71u
100. 2. 6.0205 0.0054153
1.K 2.0005 6.0226 0.052405
10.K 2.0196 6.1055 -0.16009
100.K 2.0256 6.1309 -6.0284
1.Meg 1.5711 3.9241 -53.681
10.Meg 0.22037 -13.137 179.23
```

```
**** Mess up sizes
.del m8
m8 7 8 2 2 n w=10 l=10
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 950.4u 0. 12.523 12.966
+-1.2208 -13.01 4.9638 0.0019008
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 2. 6.0204 541.71u
100. 2. 6.0205 0.0054153
1.K 2.0005 6.0226 0.052405
10.K 2.0196 6.1055 -0.16009
100.K 2.0256 6.1309 -6.0284
1.Meg 1.5711 3.9241 -53.681
10.Meg 0.22037 -13.137 179.23
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=100u l=10u
m2 6 4 7 2 n w=100u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 283.93u 0. 12.522 12.966
+-1.0699 -13.01 4.9623 567.86u
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 2. 6.0206 191.22u
100. 2. 6.0206 0.0019122
1.K 2. 6.0206 0.019107
10.K 2.0012 6.0259 0.17799
100.K 2.0144 6.0828 0.98874
1.Meg 2.7742 8.8628 6.1805
10.Meg 0.62774 -4.0444 174.72
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=100u l=10u
m2 6 4 7 2 n w=200u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0.065609 0. 12.522 12.965
+-1.1562 -13.01 5.1104 0.13122
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 2.0011 6.0254 0.021393
100. 2.0012 6.0258 0.2139
1.K 2.0092 6.0606 2.1143
10.K 2.4214 7.6813 9.7551
100.K 2.8615 9.1318 -4.1342
1.Meg 2.2256 6.9489 -53.624
10.Meg 0.31088 -10.148 178.44
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=200u l=10u
m2 6 4 7 2 n w=100u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.064003 0. 12.523 12.967
+-1.2208 -13.01 4.8168 -0.12801
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 1.9988 6.0155 -0.020414
100. 1.9988 6.0152 -0.20412
1.K 1.9915 5.9836 -2.0188
10.K 1.6801 4.5069 -9.8289
100.K 1.4386 3.1589 -5.6875
1.Meg 1.3586 2.6615 -39.066
10.Meg 0.21767 -13.244 177.79
```

```
**** set up as 40 db amplifier
.modify rfb=1meg
**** Mess up sizes
.del m5 m6
m5 5 5 1 1 p w=10u l=10u
m6 6 5 1 1 p w=10u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.096607 0. 11.408 13.061
+-1.3744 -13.01 -6.1171 -9.7574
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 97.107 39.745 -0.024407
100. 97.105 39.745 -0.24405
1.K 96.886 39.725 -2.4219
10.K 88.542 38.943 -19.399
100.K 27.114 28.664 -74.117
1.Meg 2.8455 9.083 -99.265
10.Meg 0.34273 -9.3011 -177.8
```

```
**** Mess up sizes
.del m8
m8 7 8 2 2 n w=10 l=10
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

```
**** Mess up sizes
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8
```

100.K	2.0256	6.1309	-6.0284
1.Meg	1.5711	3.9241	-53.681
10.Meg	0.22037	-13.137	179.23

```
.del m1 m2
m1 5 3 7 2 n w=1000u l=10u
m2 6 4 7 2 n w=1000u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 283.93u 0. 12.522 12.966
+-1.0699 -13.01 4.9623 567.86u
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 2. 6.0206 191.22u
100. 2. 6.0206 0.0019122
1.K 2. 6.0206 0.019107
10.K 2.0012 6.0259 0.17799
100.K 2.0144 6.0828 0.98874
1.Meg 2.7742 8.8628 6.1805
10.Meg 0.62774 -4.0444 174.72
```

```
.del m1 m2
m1 5 3 7 2 n w=100u l=10u
m2 6 4 7 2 n w=200u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0.065609 0. 12.522 12.965
+-1.1562 -13.01 5.1104 0.13122
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 2.0011 6.0254 0.021393
100. 2.0012 6.0258 0.2139
1.K 2.0092 6.0606 2.1143
10.K 2.4214 7.6813 9.7551
100.K 2.8615 9.1318 -4.1342
1.Meg 2.2256 6.9489 -53.624
10.Meg 0.31088 -10.148 178.44
```

```
.del m1 m2
m1 5 3 7 2 n w=200u l=10u
m2 6 4 7 2 n w=100u l=10u
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.064003 0. 12.523 12.967
+-1.2208 -13.01 4.8168 -0.12801
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 1.9988 6.0155 -0.020414
100. 1.9988 6.0152 -0.20412
1.K 1.9915 5.9836 -2.0188
10.K 1.6801 4.5069 -9.8289
100.K 1.4386 3.1589 -5.6875
1.Meg 1.3586 2.6615 -39.066
10.Meg 0.21767 -13.244 177.79
```

```
.del m8
m8 7 8 2 2 n w=30 l=10
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.064003 0. 12.523 12.967
+-1.2208 -13.01 4.8168 -0.12801
.ac 10 10meg dec
#Freq v(10) vdb(10) vp(10)
10. 1.9988 6.0155 -0.020414
100. 1.9988 6.0152 -0.20412
1.K 1.9915 5.9836 -2.0188
10.K 1.6801 4.5069 -9.8289
100.K 1.4386 3.1589 -5.6875
1.Meg 1.3586 2.6615 -39.066
10.Meg 0.21767 -13.244 177.79
```

```
.del m8
m8 7 8 2 2 n w=30 l=10
.op
#
+ v(7) v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.064003 0. 12.523 12.967
+-1.2208 -13.01 4.8168 -0.12801

```

```

# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 287.76u 0. 12.522 12.966
+-1.0699 -13.01 4.9943 0.029063
.ac 10 10meg dec
#FREQ v(10) vdb(10) vp(10)
10. 100.93 40.081 -0.010259
100. 100.93 40.081 -0.10259
1.K 100.92 40.079 -1.0258
10.K 99.371 39.945 -10.147
100.K 49.841 33.952 -61.714
1.Meg 5.638 15.023 -99.622
10.Meg 0.65769 -3.6396 177.97

```

```

.del m1 m2
m1 5 3 7 2 n w=100u l=10u
m2 6 4 7 2 n w=200u l=10u
.op
# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0.065514 0. 12.522 12.897
+-1.1563 -13.01 12.361 6.6169
.ac 10 10meg dec
#FREQ v(10) vdb(10) vp(10)
10. 100.88 40.076 -0.0066844
100. 100.88 40.077 -0.066873
1.K 101.24 40.107 -0.69712
10.K 111.32 40.931 -19.083
100.K 24.39 27.744 -80.393
1.Meg 2.48 7.8889 -99.846
10.Meg 0.30423 -10.336 -177.69

```

```

.del m1 m2
m1 5 3 7 2 n w=200u l=10u
m2 6 4 7 2 n w=100u l=10u
.op
# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.063917 0. 12.522 13.029
+-1.2207 -13.01 -2.3306 -6.4556
.ac 10 10meg dec
#FREQ v(10) vdb(10) vp(10)
10. 100.76 40.066 -0.0489
100. 100.75 40.065 -0.48896
1.K 100.16 40.014 -4.8551
10.K 74.684 37.465 -33.078
100.K 16.701 24.455 -78.71
1.Meg 1.725 4.7357 -99.711
10.Meg 0.20915 -13.591 -177.8

```

```

.del m8
m8 7 8 2 2 n w=30 l=10
.op
# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. -0.096607 0. 11.408 13.061
+-1.3744 -13.01 -6.1171 -9.7574
.ac 10 10meg dec
#FREQ v(10) vdb(10) vp(10)
10. 97.107 39.745 -0.024407
100. 97.105 39.745 -0.24405
1.K 96.886 39.725 -2.4219
10.K 88.542 38.943 -19.399
100.K 27.114 28.664 -74.117
1.Meg 2.8455 9.083 -99.265
10.Meg 0.34273 -9.3011 -177.8

```

```

**** restore sizes to normal
.del m5 m6 m8 m1 m2
m5 5 5 1 1 p w=20u l=10u
m6 6 5 1 1 p w=20u l=10u
m8 7 8 2 2 n w=10 l=10
m1 5 3 7 2 n w=100u l=10u
m2 6 4 7 2 n w=100u l=10u

```

```

**** verify op point, no feedback
.del rfb
.op
# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 0. 12.954 12.957
+-1.2211 -13.01 5.9844 0.91187
.ac .1 10meg dec
#FREQ v(10) vdb(10) vp(10)
0.1 47.72K 93.574 -0.15851
1. 47.702K 93.571 -1.5847
10. 45.993K 93.254 -15.464
100. 16.222K 84.202 -70.125
1.K 1.7239K 64.73 -87.91
10.K 172.95 44.758 -89.779
100.K 17.324 24.773 -91.04
1.Meg 1.7391 4.8067 -100.77
10.Meg 0.21411 -13.387 -176.9

```

```

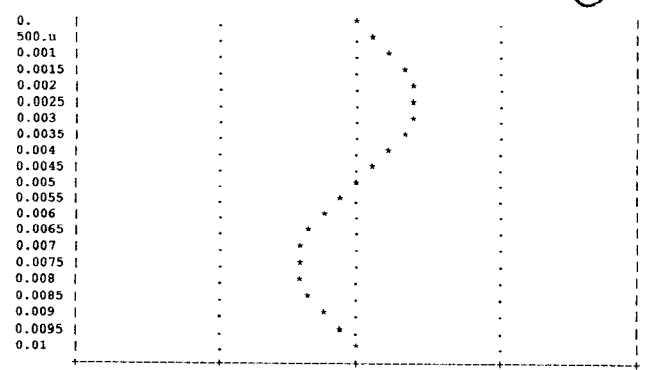
**** put it back for measurements
rfb 10 3 lmeg
.op
# v(1) v(2) v(3) v(4) v(5) v(6)
+ v(7) v(8) v(9) v(10)
300.15 15. -15. 20.879u 0. 12.954 12.966
+-1.2211 -13.01 4.9641 0.0021088
.ac 10 10meg dec
#FREQ v(10) vdb(10) vp(10)
10. 100.79 40.068 -0.032802
100. 100.79 40.068 -0.32802
1.K 100.64 40.055 -3.2778
10.K 87.617 38.852 -30.141
100.K 17.159 24.69 -81.353
1.Meg 1.7469 4.8455 -99.868
10.Meg 0.21381 -13.399 -177.07

```

```

.print four v(10)
.plot tran v(10)
.modify rload=10k
.generator freq=100 ampl=.01
.tran 0 .01 .0005
v(10) -5. -2.5 0. 2.5 5.

```

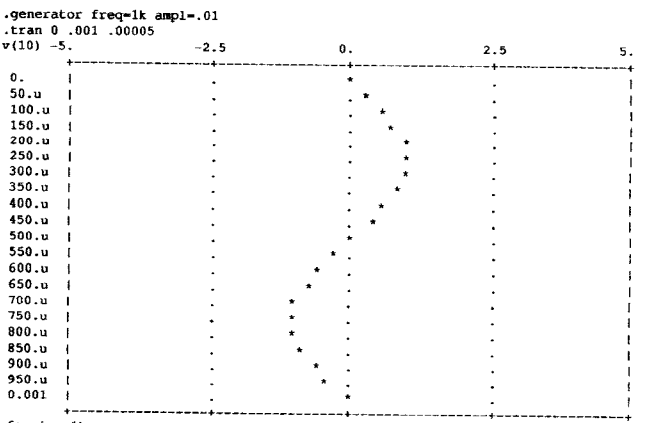


```

.fourier 100
#Time v(10)
0.01 -0.0062433
0.010313 0.19375
0.010625 0.38315
0.010938 0.55793
0.01125 0.71134
0.011563 0.83753
0.011875 0.9316
0.012188 0.98999
0.0125 1.0104
0.012813 0.99211
0.013125 0.93575
0.013438 0.84356
0.01375 0.71901
0.014063 0.56696
0.014375 0.39317
0.014688 0.20441
0.015 0.0078438
0.015313 -0.18889
0.015625 -0.37832
0.015938 -0.55307
0.01625 -0.70652
0.016563 -0.83267
0.016875 -0.92679
0.017188 -0.98514
0.0175 -1.0056
0.017813 -0.98726
0.018125 -0.93094
0.018438 -0.8387
0.01875 -0.71419
0.019063 -0.56209
0.019375 -0.38834
0.019688 -0.19953
0.02 -0.0030086

```

#	v(10)	actual	dB	phase	value	dB	phase
0.0023209	-52.69	90.000	0.0023024	-52.76	90.320		
100.	1.008	0.07	-0.320	0.00	0.000		
200.	196.11u	-74.15	-90.457	194.55u	-74.22	-90.137	
300.	202.94u	-73.85	-90.113	201.32u	-73.92	-89.793	
400.	202.87u	-73.86	-90.155	201.26u	-73.92	-89.835	
500.	202.78u	-73.86	-90.187	201.17u	-73.93	-89.867	
600.	202.67u	-73.86	-90.214	201.06u	-73.93	-89.894	
700.	202.56u	-73.87	-90.236	200.95u	-73.94	-89.916	
800.	202.43u	-73.87	-90.255	200.82u	-73.94	-89.935	
900.	202.31u	-73.88	-90.270	200.7u	-73.95	-89.950	



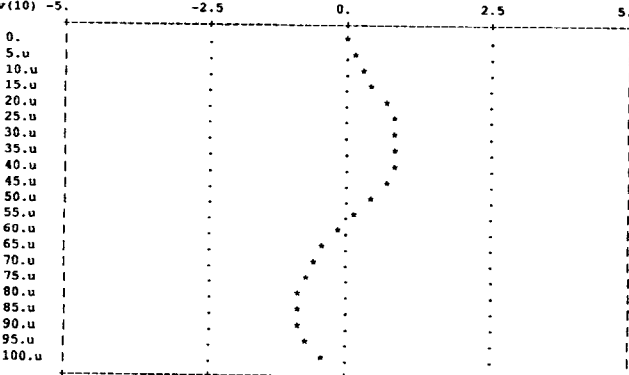
```

.fourier 1k
#Time v(10)
0.001 -0.051983
0.0010313 0.14554
0.0010625 0.33799
0.0010938 0.51589
0.001125 0.67533
0.0011563 0.8081
0.0011875 0.91066
0.0012188 0.9776
0.00125 1.0078
0.0012813 0.9987
0.0013125 0.95204
0.0013438 0.86818
0.001375 0.7518
0.0014063 0.60589
0.0014375 0.43753
0.0014688 0.25172
0.0015 0.057043
0.0015313 -0.14047
0.0015625 -0.33178
0.0015938 -0.51099
0.001625 -0.66973

```

0.0016563	-0.80338
0.0016875	-0.90532
0.0017188	-0.97309
0.00175	-1.0026
0.0017813	-0.99424
0.0018125	-0.9468
0.0018438	-0.86359
0.001875	-0.74635
0.0019063	-0.60106
0.0019375	-0.43185
0.0019688	-0.24668
0.002	-0.051216

```
.generator freq=10k ampl=.01
.tran 0 .0001 .000005
```

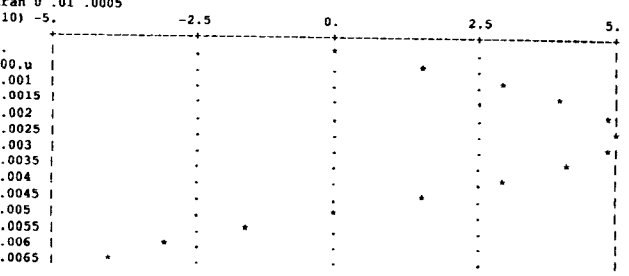


```
.fourier 10k
```

#Time	v(10)
100.u	-0.42349
103.13u	-0.26163
106.25u	-0.088715
109.38u	0.086508
112.5u	0.26071
115.62u	0.42273
118.75u	0.57035
121.87u	0.6937
125.u	0.79212
128.12u	0.85793
131.25u	0.89275
134.37u	0.89152
137.5u	0.85843
140.63u	0.79109
143.75u	0.69605
146.88u	0.57328
150.u	0.4312
153.13u	0.2715
156.25u	0.10377
159.38u	-0.06931
162.5u	-0.23781
165.63u	-0.39893
168.75u	-0.5432
171.88u	-0.66854
175.u	-0.76679
178.13u	-0.83734
181.25u	-0.87408
184.38u	-0.87854
187.5u	-0.84718
190.63u	-0.78407
193.75u	-0.68844
196.88u	-0.56691
200.u	-0.42119

#freq	value	dB	phase	value	dB	phase
0.	0.0080825	-41.85	90.000	0.0090968	-40.82	118.707
10.K	0.88849	-1.03	-28.707	1.	0.00	0.000
20.K	0.0050102	-46.00	-55.488	0.005639	-44.98	-26.781
30.K	187.52u	-74.54	-174.643	211.05u	-73.51	-145.936
40.K	142.95u	-76.92	-169.708	160.45u	-75.89	-141.001
50.K	101.14u	-79.90	-154.062	113.83u	-78.87	-125.354
60.K	83.921u	-81.52	-136.194	94.454u	-80.50	-107.487
70.K	81.512u	-81.78	-119.927	91.742u	-80.75	-91.220
80.K	85.712u	-81.34	-108.472	96.469u	-80.31	-79.765
90.K	92.145u	-80.71	-101.244	103.71u	-79.68	-72.537

```
**** higher level
.generator freq=100 ampl=.05
.tran 0 .01 .0005
```



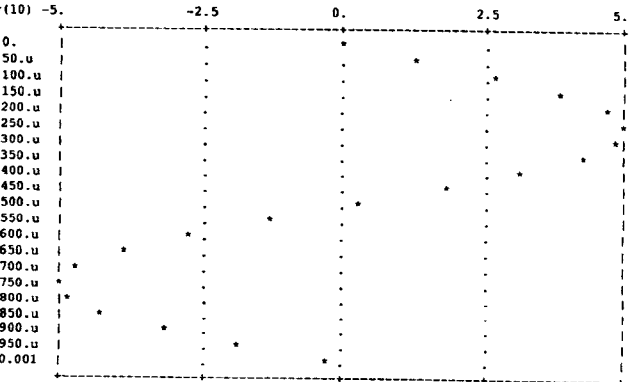
0.007	*	.	.	.	.
0.0075	*	.	.	.	.
0.008	*	.	.	.	.
0.0085	*	.	.	.	.
0.009	*	.	.	.	.
0.0095	*	.	.	.	.
0.01	*	.	.	.	.

```
.fourier 100
```

#Time	v(10)
0.01	-0.027962
0.010313	0.95922
0.010625	1.9062
0.010938	2.7798
0.01125	3.547
0.011563	4.1777
0.011875	4.6482
0.012188	4.9399
0.0125	5.0422
0.012813	4.9506
0.013125	4.659
0.013438	4.2079
0.01375	3.5854
0.014063	2.825
0.014375	1.9563
0.014688	1.0123
0.015	0.029659
0.015313	-0.95418
0.015625	-1.9012
0.015938	-2.7752
0.01625	-3.5423
0.016563	-4.1733
0.016875	-4.6437
0.017188	-4.9357
0.0175	-5.0378
0.017813	-4.9463
0.018125	-4.6645
0.018438	-4.2034
0.01875	-3.5806
0.019063	-2.8202
0.019375	-1.9513
0.019688	-1.0074
0.02	-0.024609

#freq	value	dB	phase	value	dB	phase
0.	0.0022346	-53.02	90.000	443.38u	-67.06	90.311
100.	5.0401	14.05	-0.311	1.	0.00	0.000
200.	41.28u	-87.69	-133.290	8.1904u	-101.73	-132.979
300.	201.33u	-73.92	-87.520	39.946u	-87.97	-87.210
400.	204.23u	-73.80	-88.036	40.522u	-87.85	-87.726
500.	205.9u	-73.73	-87.818	40.853u	-87.78	-87.507
600.	207.96u	-73.64	-87.604	41.262u	-87.69	-87.294
700.	209.94u	-73.56	-87.587	41.654u	-87.61	-87.276
800.	212.1u	-73.47	-87.714	42.082u	-87.52	-87.403
900.	214.28u	-73.38	-87.921	42.515u	-87.43	-87.611

```
.generator freq=1k ampl=.05
.tran 0 .001 .00005
```



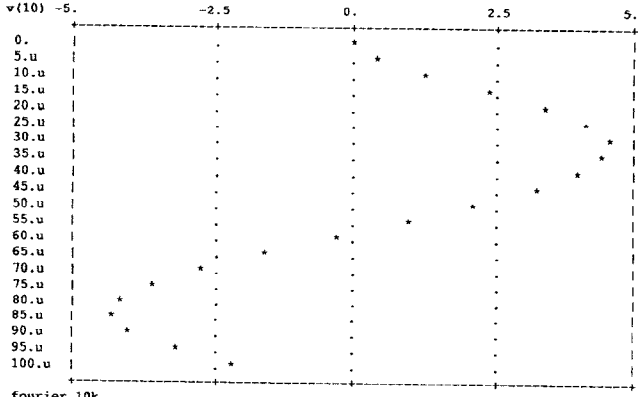
```
.fourier 1k
```

#Time	v(10)
0.001	-0.26724
0.0010313	0.72506
0.0010625	1.6833
0.0010938	2.575
0.001125	3.3697
0.0011563	4.0337
0.0011875	4.5441
0.0012188	4.8793
0.00125	5.0286
0.0012813	4.9843
0.0013125	4.7501
0.0013438	4.3331
0.001375	3.7509
0.0014063	3.0241
0.0014375	2.1821
0.0014688	1.2554
0.0015	0.28116
0.0015313	-0.70498
0.0015625	-1.6633
0.0015938	-2.5589
0.001625	-3.3552
0.0016563	-4.0233
0.0016875	-4.5356
0.0017188	-4.8741
0.00175	-5.0236
0.0017813	-4.9804
0.0018125	-4.7441
0.0018438	-4.3259
0.001875	-3.7399
0.0019063	-3.0109
0.0019375	-2.1651
0.0019688	-1.2371
0.002	-0.26069

#freq	value	dB	phase	value	dB	phase
-------	-------	----	-------	-------	----	-------

0.	0.0059419	-44.52	90.000	0.0011805	-58.56	93.089
1.K	5.0334	14.04	-3.089	1.	0.00	0.000
2.K	0.0036275	-48.81	75.764	720.7u	-62.84	78.853
3.K	420.09u	-67.53	-91.265	83.461u	-81.57	-88.176
4.K	385.77u	-68.27	-83.928	76.641u	-82.31	-80.839
5.K	396.77u	-68.03	-83.057	78.828u	-82.07	-79.968
6.K	412.44u	-67.69	-82.580	81.94u	-81.73	-79.491
7.K	425.98u	-67.41	-83.570	84.631u	-81.45	-80.481
8.K	439.67u	-67.14	-84.680	87.351u	-81.17	-81.591
9.K	446.19u	-67.01	-86.250	88.647u	-81.05	-83.161

```
.generator freq=10k ampl=.05
.tran 0 .0001 .000005
```



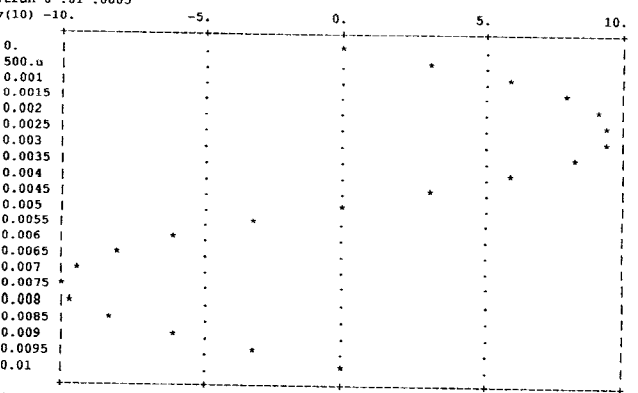
```
.fourier 10k
```

#Time	v(10)
100.u	-1.6291
103.13u	-0.83131
106.25u	0.024621
109.38u	0.89275
112.5u	1.7443
115.62u	2.5305
118.75u	3.2292
121.87u	3.8013
125.u	4.2366
128.12u	4.509
131.25u	4.6223
134.37u	4.5643
137.5u	4.3524
140.63u	3.9861
143.75u	3.4935
146.88u	2.8827
150.u	2.1883
153.13u	1.4228
156.25u	0.62378
159.38u	-0.19514
162.5u	-0.99594
165.63u	-1.7657
168.75u	-2.4673
171.88u	-3.0891
175.u	-3.5955
178.13u	-3.9777
181.25u	-4.2041
184.38u	-4.2727
187.5u	-4.1609
190.63u	-3.8797
193.75u	-3.422
196.88u	-2.8165
200.u	-2.0741

# v(10)	actual	relative
0.	0.24381	-12.26
10.K	4.4403	12.95
20.K	0.16713	-15.54
30.K	0.05848	-24.66
40.K	0.039401	-28.09
50.K	0.031354	-30.07
60.K	0.026431	-31.56
70.K	0.023054	-32.74
80.K	0.020618	-33.72
90.K	0.018808	-34.51

```
**** even higher level
.plot tran v(10) (-10,10)
```

```
.generator freq=100 ampl=.1
.tran 0 .01 .0005
```



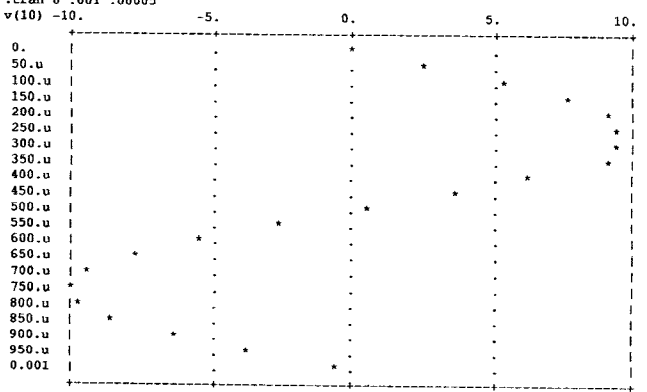
```
.fourier 100
```

#Time	v(10)
0.01	-0.051503
0.010313	1.9163

0.010625	3.8098
0.010938	5.5572
0.01125	7.0911
0.011563	8.3526
0.011875	9.1272
0.012188	9.3415
0.0125	9.3896
0.012813	9.3702
0.013125	9.2211
0.013438	8.4051
0.01375	7.1632
0.014063	5.6444
0.014375	3.9132
0.014688	2.0197
0.015	0.059469
0.015313	-1.9129
0.015625	-3.8028
0.015938	-5.5546
0.01625	-7.0856
0.016563	-8.3508
0.016875	-9.289
0.017188	-9.8754
0.0175	-10.077
0.017813	-9.8963
0.018125	-9.3308
0.018438	-8.4102
0.01875	-7.163
0.019063	-5.6435
0.019375	-3.9043
0.019688	-2.0175
0.02	-0.051022

# v(10)	actual	relative
0.	0.061998	-24.15
100.	9.9548	19.96
200.	0.11789	-18.57
300.	0.10485	-19.59
400.	0.08951	-20.96
500.	0.072765	-22.76
600.	0.05598	-25.04
700.	0.040201	-27.92
800.	0.026164	-31.65
900.	0.014536	-36.75

```
.generator freq=1k ampl=.1
.tran 0 .001 .00005
```



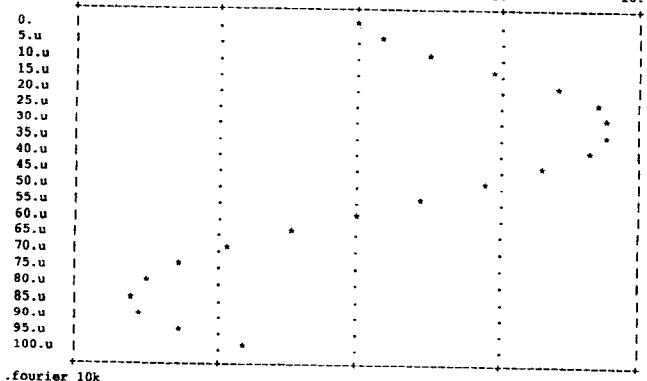
```
.fourier 1k
```

#Time	v(10)
0.001	-0.5094
0.0010313	1.4614
0.0010625	3.3761
0.0010938	5.1601
0.001125	6.7439
0.0011563	8.0709
0.0011875	8.9258
0.0012188	9.209
0.00125	9.3165
0.0012813	9.3491
0.0013125	9.3264
0.0013438	9.1421
0.001375	7.5892
0.0014063	6.0564
0.0014375	4.3749
0.0014688	2.524
0.0015	0.57683
0.0015313	-1.3948
0.0015625	-3.3131
0.0015938	-5.1062
0.001625	-6.7024
0.0016563	-8.0418
0.0016875	-9.0702
0.0017188	-9.7491
0.00175	-10.05
0.0017813	-9.9633
0.0018125	-9.4902
0.0018438	-8.6512
0.001875	-7.4773
0.0019063	-6.016
0.0019375	-4.3223
0.0019688	-2.4639
0.002	-0.51052

# v(10)	actual	relative
0.	0.034953	-29.13
1.K	9.9593	19.96
2.K	0.13531	-17.37
3.K	0.1275	-17.89
4.K	0.125	-18.06
5.K	0.11125	-19.07
6.K	0.089086	-21.00
7.K	0.063016	-24.01
8.K	0.039398	-28.09
9.K	0.026078	-31.67

```
.generator freq=10k ampl=.1
```

.tran 0 .0001 .000005  
v(10) -10.



.fourier 10k

#Time	v(10)
100.u	-4.1397
103.13u	-2.392
106.25u	-0.50624
109.38u	1.4155
112.5u	3.275
115.62u	4.9832
118.75u	6.4661
121.87u	7.6663
125.u	8.5285
128.12u	8.8713
131.25u	8.9696
134.37u	8.9561
137.5u	8.7887
140.63u	8.1735
143.75u	7.1391
146.88u	5.9307
150.u	4.5878
153.13u	3.153
156.25u	1.668
159.38u	0.17232
162.5u	-1.298
165.63u	-2.7099
168.75u	-4.0313
171.88u	-5.2291
175.u	-6.2667
178.13u	-7.1021
181.25u	-7.6887
184.38u	-7.9785
187.5u	-7.9276
190.63u	-7.5051
193.75u	-6.7016
196.88u	-5.5353
200.u	-4.0547

# v(10)	actual	phase	value	relative	phase
0.	value	dB	phase	value	dB
0.	0.67915	-3.36	90.000	0.079152	-22.03
10.K	8.5803	18.67	-30.119	1.	0.00
20.K	0.50865	-5.87	-53.106	0.059281	-24.54
30.K	0.10925	-19.23	-40.339	0.012732	-37.90
40.K	0.058638	-24.64	-165.795	0.006834	-41.31
50.K	0.042691	-27.39	69.737	0.0049754	-46.06
60.K	0.040587	-27.83	-60.527	0.0047303	-46.50
70.K	0.032698	-29.71	-166.213	0.0038108	-48.38
80.K	0.01528	-36.32	72.451	0.0017809	-54.99
90.K	0.01335	-37.49	-66.957	0.0015559	-56.16