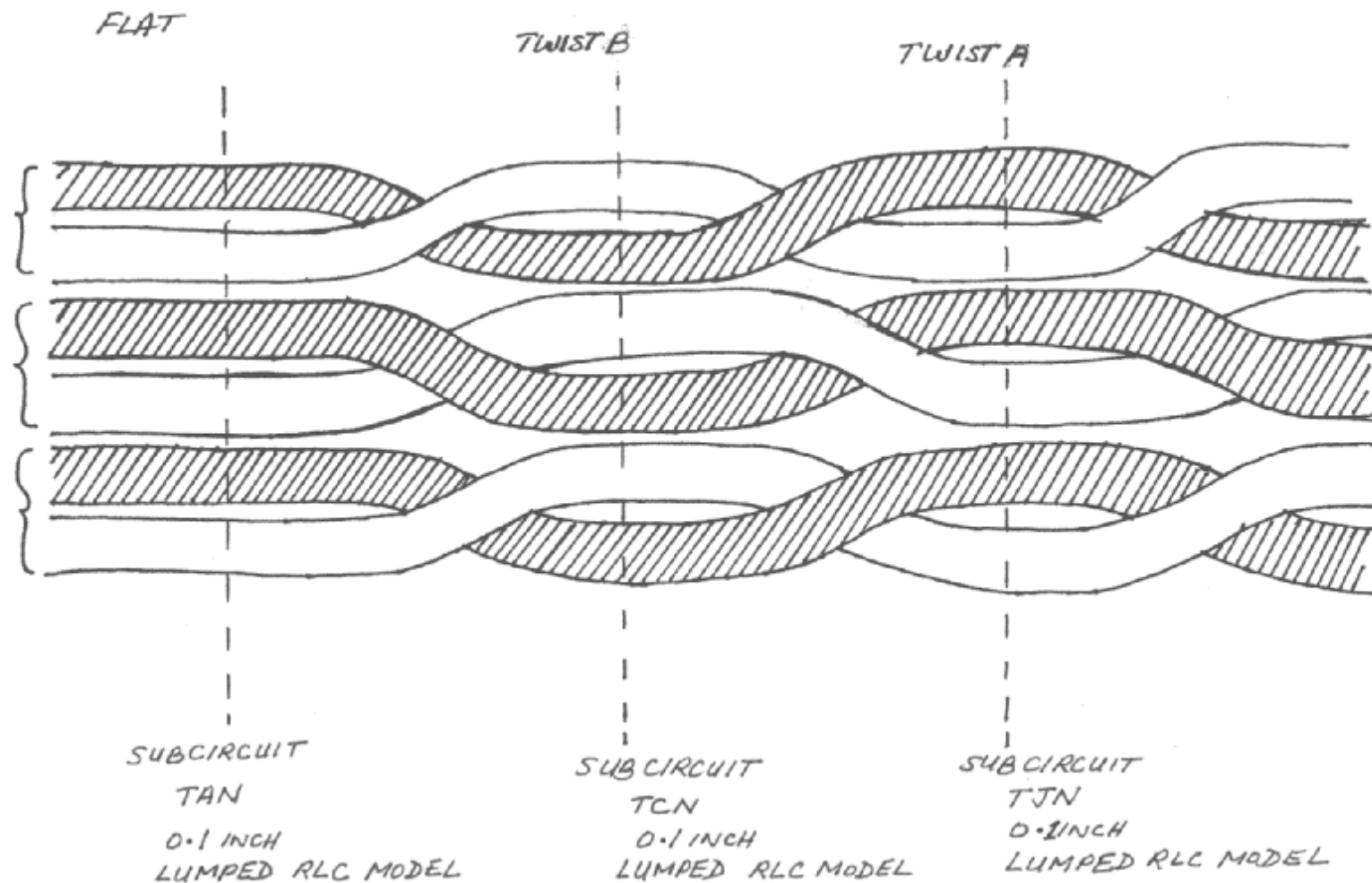
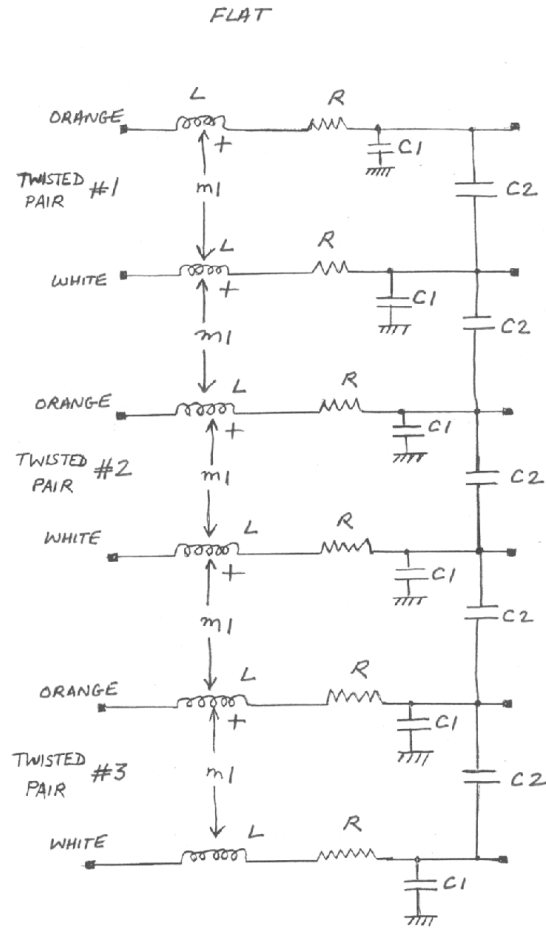


Amphenol Cable Cross Sections



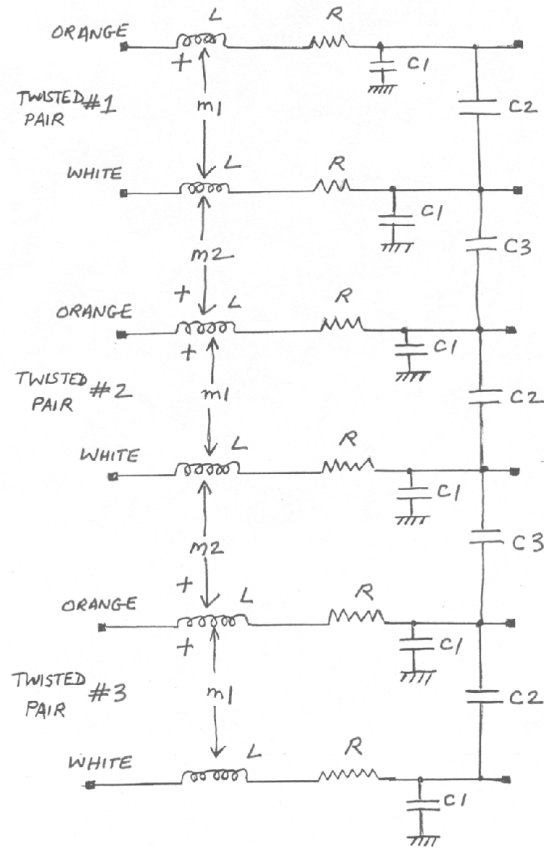
Flat Section - Lumped RLC Model



SUBCIRCUIT TAN
0.1 INCH LUMPED RLC MODEL

Twist A - Lumped RLC Model

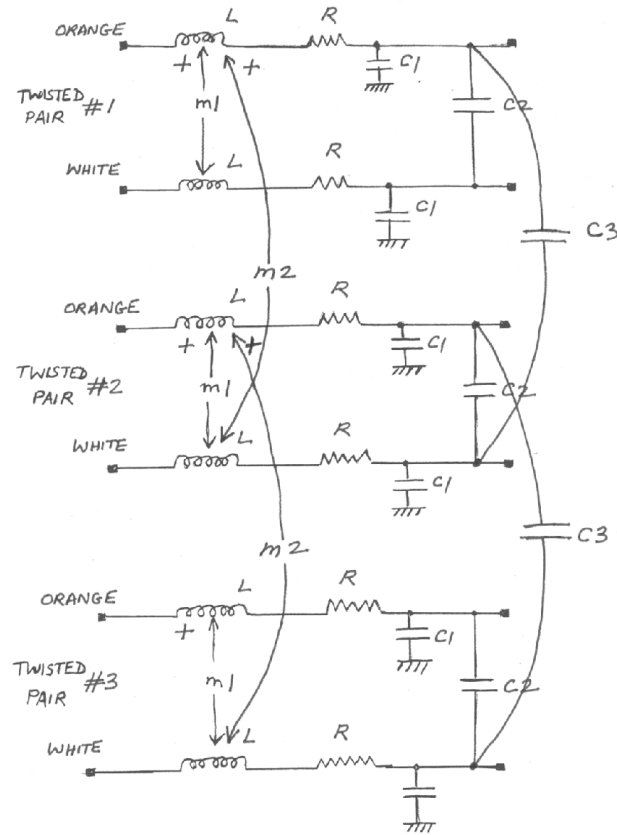
TWIST A



SUBCIRCUIT TJN
0.1 INCH LUMPED RLC MODEL

Twist B - Lumped RLC Model

TWIST B.



SUBCIRCUIT TCN
0.1 INCH LUMPED RLC MODEL

Hspice - Simulation Model

```
xTan22 187 188 189 190 191 192 193 194 195 196 197 198 tan
xTan23 193 194 195 196 197 198 199 200 201 202 203 204 tan
xTan24 199 200 201 202 203 204 205 206 207 208 209 210 tan
xTan25 205 206 207 208 209 210 211 212 213 214 215 216 tan
.ends tdn
```

Umesh Chandra
6/9/00
Seagate Technology

```
.subckt tcn 41 42 43 44 45 46 53 54 55 56 57 58
l41 41 47 1.35n
k41 141 142 .163
k4144 141 144 .0652
r41 47 53 .0009369
c41 53 0 .167p
c53 53 54 .108p
o5856 53 56 .0432p
l42 42 48 1.35n
r42 48 54 .0009369
c42 54 0 .167p
l43 43 49 1.35n
k43 143 144 .163
k4952 143 146 .0652
r43 49 55 .0009369
c43 55 0 .167p
c55 55 56 .108p
o5598 55 58 .0432p
l44 44 50 1.35n
r44 50 56 .0009369
c44 56 0 .167p
l45 45 51 1.35n
k45 145 146 .163
r45 51 57 .0009369
c45 57 0 .167p
c57 57 58 .108p
l46 46 52 1.35n
r46 52 58 .0009369
c46 58 0 .167p
.ends tcn
```

TCN
Twist B
0.1 inch

```
.subckt tan 1 2 3 4 5 6 13 14 15 16 17 18
l1 1 7 1.35n
k1 11 12 .163
r1 7 13 .0009369
c1 13 0 .167p
c13 13 14 .108p
l2 2 8 1.35n
k2 12 13 .163
r2 8 14 .0009369
c2 14 0 .167p
c14 14 15 .108p
l3 3 9 1.35n
k3 13 14 .163
r3 9 15 .0009369
c3 15 0 .167p
c15 15 16 .108p
l4 4 10 1.35n
k4 14 15 .163
r4 10 16 .0009369
c4 16 0 .167p
c16 16 17 .108p
l5 5 11 1.35n
k5 15 16 .163
r5 11 17 .0009369
c5 17 0 .167p
c17 17 18 .108p
l6 6 12 1.35n
r6 12 18 .0009369
c6 18 0 .167p
.ends tan
```

TAN
Flat
0.1 inch

```
.subckt tjn 801 802 803 804 805 806 813 814 815 816 817 818
l801 801 807 1.35n
k801 1801 1802 .163
r801 807 813 .0009369
c801 813 0 .167p
c813 813 814 .108p
l802 802 808 1.35n
k802 1803 1802 .0652
r802 808 814 .0009369
c802 814 0 .167p
c814 814 815 .0432p
l803 803 809 1.35n
k803 1803 1804 .163
r803 809 815 .0009369
c803 815 0 .167p
c815 815 816 .108p
l804 804 810 1.35n
k804 1805 1804 .0652
r804 810 816 .0009369
c804 816 0 .167p
c816 816 817 .0432p
l805 805 811 1.35n
k805 1805 1806 .163
r805 811 817 .0009369
c805 817 0 .167p
c817 817 818 .108p
l806 806 812 1.35n
r806 812 818 .0009369
c806 818 0 .167p
.ends tjn
.probe v{601} v{602} v{603} v{604} v{605} v{606} v{637} v{638} v{639} v{640} \
v{641} v{642} v{601,602} v{603,604} v{605,606} v{637,638} v{639,640} \
v{641,642}
.End
```

TJN
Twist A
0.1 inch

Hspice - Simulation Model

UMESH CHANDRA
6/9/00

SEAGATE TECHNOLOGY

```

r005 805 912 52
r008 808 885 18a
r009 805 0 5p
r006 806 912 52
r008 806 0 5p
r008 806 0 5p
r005888 912 912 125
v912 912 0 1.25
e837 837 834 52
r007 800 837 18a
o537 837 0 5p
r038 838 914 52
r038 838 0 5p
o838 838 0 5p
r037838 914 912 125
v915 915 0 1.25
r041 841 918 52
r041 841 0 5p
o841 841 0 5p
r042 842 918 52
r042 842 0 5p
o842 842 0 5p
r041842 918 912 125
v917 917 0 1.25
w182 801 882 603 888 608 806 887 608 889 610 611 612 tin
w182 807 888 608 810 612 812 813 814 815 816 817 618 tin
w183 613 618 615 616 617 818 829 820 821 822 823 824 tin
w184 619 623 621 622 623 824 837 638 639 640 641 642 tin
-define4 644 801 882 803 884 805 806 883 832 533 534 535 536
x001 501 582 503 588 505 506 587 508 589 510 511 512 tan
x002 507 588 509 510 512 513 514 515 516 517 518 tan
x003 515 518 515 516 517 518 529 520 521 522 523 524 tan
x004 519 520 521 522 523 524 528 528 527 528 529 530 tan
x005 525 516 527 528 528 530 531 532 533 534 535 538 tan
-define tin
-define1 648 803 884 805 886 807 808 887 808 889 810 811 812 813 814 tan
x101 809 811 812 813 814 815 816 817 818 819 820 tin
w102 815 818 817 818 819 820 821 822 823 824 825 826 tin
x103 821 822 823 824 825 826 827 828 829 830 831 832 tin
x104 827 828 829 830 832 832 833 834 835 836 837 838 tin
x006 835 836 835 836 837 838 839 840 841 842 843 844 tan
x105 839 843 841 842 843 844 845 846 847 848 849 850 tan
x106 845 846 847 848 849 850 851 852 853 854 855 856 tan
x107 851 852 853 854 855 856 857 858 859 860 861 862 tin
-define tan
    
```

4x119 = 476 INCHES
= 12.1 INCHES TWIST & FLAT

TIN 5x 23.80 INCHES OF
TWIST & FLAT (TGN)
119.00 INCHES

TGN
2.5 INCHES OF FLAT (TDN)
2.0 INCHES OF TWIST & B (TFN)
1 INCH OF TWIST A & B (TEN)
0.3 INCHES OF TWIST A & B (TIN)
TOTAL 2.5" FLAT, 2.3" TWIST

```

-define1 tin 367 368 369 370 371 372 373 374 375 376 377 378 tan
xtan1 367 368 369 370 371 372 373 374 375 376 377 378 tan
xtan2 373 374 375 376 377 378 379 380 381 382 383 384 tan
xtan3 379 380 381 382 383 384 385 386 387 388 389 390 tan
xtan4 385 386 387 388 389 390 391 392 393 394 395 396 tan
xtan5 391 392 393 394 395 396 397 398 399 400 401 402 tan
-define tin
-define1 tan 301 302 303 304 305 306 307 308 309 310 311 312 tan
xtan1 301 302 303 304 305 306 307 308 309 310 311 312 tan
xtan2 313 314 315 316 317 318 319 320 321 322 323 324 tan
xtan3 319 320 321 322 323 324 325 326 327 328 329 330 tan
xtan4 325 326 327 328 329 330 331 332 333 334 335 336 tan
xtan5 331 332 333 334 335 336 337 338 339 340 341 342 tan
xtan6 337 338 339 340 341 342 343 344 345 346 347 348 tan
xtan7 345 346 347 348 349 350 351 352 353 354 355 356 tan
xtan8 349 350 351 352 353 354 355 356 357 358 359 360 tan
xtan9 355 356 357 358 359 360 361 362 363 364 365 366 tan
-define tan
-define1 tan 61 62 63 64 65 66 67 68 69 70 71 72 tan
xtan1 61 62 63 64 65 66 67 68 69 70 71 72 tan
xtan2 67 68 69 70 71 72 73 74 75 76 77 78 tan
xtan3 73 74 75 76 77 78 79 80 81 82 83 84 tan
xtan4 79 80 81 82 83 84 85 86 87 88 89 90 tan
xtan5 85 86 87 88 89 90 91 92 93 94 95 96 tan
xtan6 91 92 93 94 95 96 97 98 99 100 101 102 tan
xtan7 97 98 99 100 101 102 103 104 105 106 107 108 tan
xtan8 108 109 109 108 107 108 109 110 111 112 113 114 tan
xtan9 109 110 111 112 113 114 115 116 117 118 119 120 tan
xtan10 115 116 117 118 119 120 121 122 123 124 125 126 tan
xtan11 121 122 123 124 125 126 127 128 129 130 131 132 tan
xtan12 127 128 129 130 131 132 133 134 135 136 137 138 tan
xtan13 133 134 135 136 137 138 139 140 141 142 143 144 tan
xtan14 139 140 141 142 143 144 145 146 147 148 149 150 tan
xtan15 145 146 147 148 149 150 151 152 153 154 155 156 tan
xtan16 151 152 153 154 155 156 157 158 159 160 161 162 tan
xtan17 157 158 159 160 161 162 163 164 165 166 167 168 tan
xtan18 163 164 165 166 167 168 169 170 171 172 173 174 tan
xtan19 169 170 171 172 173 174 175 176 177 178 179 180 tan
xtan20 175 176 177 178 179 180 181 182 183 184 185 186 tan
xtan21 181 182 183 184 185 186 187 188 189 190 191 192 tan
    
```

TFN
5 INCHES OF TWIST A & TWIST B

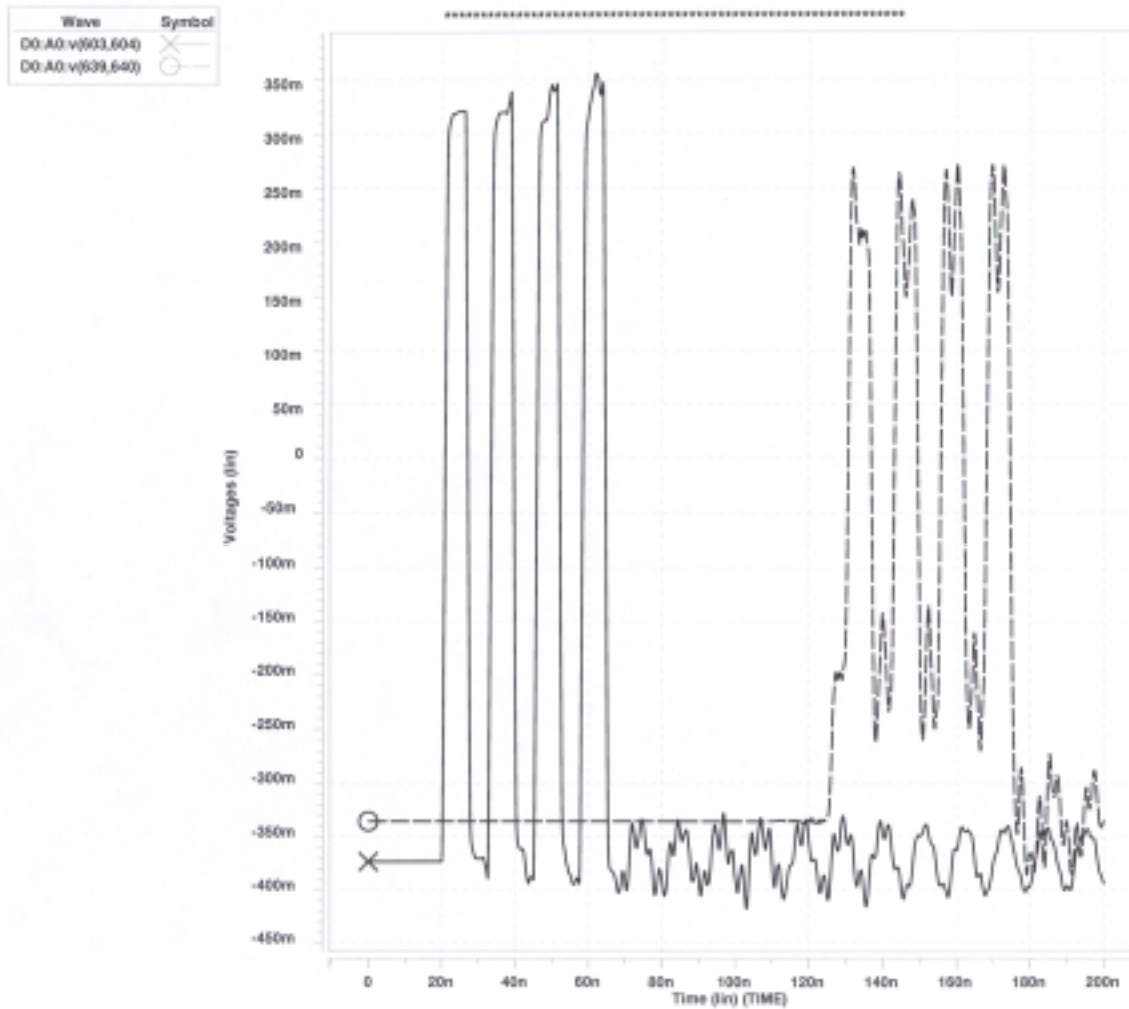
TEN
1 INCH OF TWIST A & TWIST B

TDN
25x 0.1 INCH = 2.5 INCH
(TAN)
2.5 INCHES OF FLAT

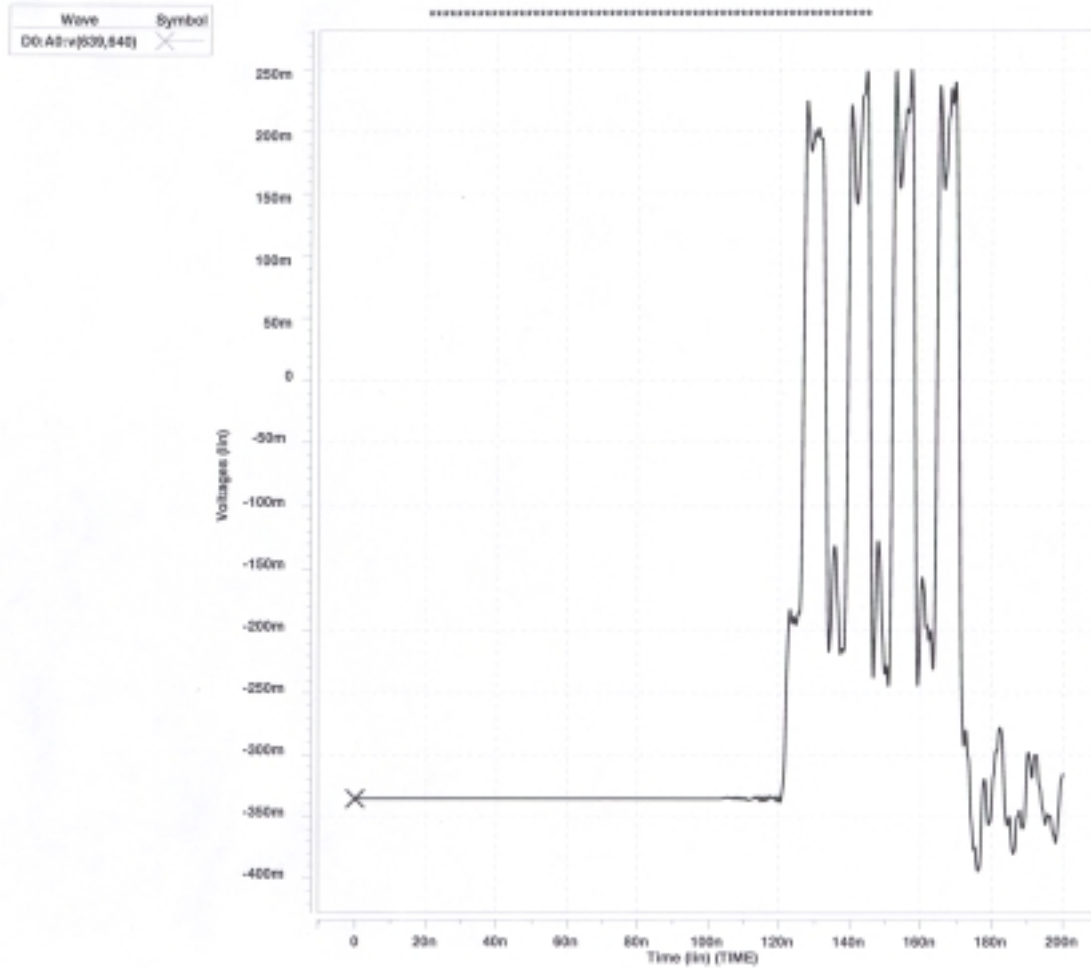
Hspice - Simulation Model

```
*****
* newdiff-twisted-cable12 model
* 12 meters of twisted pair cable, lumped RLC model in .1 inch lumps
* This is a complex model of the Amphenol Spectra Strip cable, 2.5 inches
* of flat section followed by 21.5 inches of twisted section
* subckt tan models 0.1 inches of the flat section
* subckt tjn models 0.1 inches of twist A
* subckt tcn models 0.1 inches of twist B
* subckt tdn models 2.5 inches of the flat section
* subckt ten models 1 inch of the twisted section, twist A then twist B
* subckt tfn models 5 inches of the twisted section
* subckt tgn models 2.5 inches of flat followed by 23.8 inches of twist
* subckt tin models 119 inches of composite cable
* xtln1 through xtln4 models 476 inches {12.09 meters} of composite cable
*****
.Tran .02ns 200ns
.Options Post List Probe ACCURATE DVDT LVLTIM=3
*i11 vcc 603 pwl 0 0 20n 0 21.4n 5m 26.25n 5m 27.65n 0 32.5n 0 \
*33.9n 5m 63.75n 5m 65.15n 0
*i11 vcc 603 pwl 0 0 20n 0 21.4n 5m 26.25n 5m 27.65n 0 32.5n 0 \
*33.9n 5m 63.75n 5m 65.15n 0
*i170 604 0 pwl 0 0 20n 0 21.4n 5m 26.25n 5m 27.65n 0 32.5n 0 \
*33.9n 5m 63.75n 5m 65.15n 0
*i170 604 0 pwl 0 0 20n 0 21.4n 5m 26.25n 5m 27.65n 0 32.5n 0 \
*33.9n 5m 63.75n 5m 65.15n 0
*i110 603 0 pwl 0 9m 20n 9m 21.4n 0 26.25n 0 27.65n 9m 32.5n 9m \
*33.9n 0 63.75n 0 65.15n 9m
*i110 603 0 pwl 0 9m 20n 9m 21.4n 0 26.25n 0 27.65n 9m 32.5n 9m 0 \
*38.75n 0 38.89n 0 63.89n 0 65.15n 9m
*i177 vcc 604 pwl 0 9m 20n 9m 21.4n 0 26.25n 0 27.65n 9m 32.5n 9m \
*33.9n 0 63.75n 0 65.15n 9m
*i177 vcc 604 pwl 0 9m 20n 9m 21.4n 0 26.25n 0 27.65n 9m 32.5n 9m 33.9n 0 \
*38.75n 0 38.89n 0 63.89n 0 65.15n 9m
*16015 vcc 603 pwl 0 0 20n 0 21.4n 5m 26.25n 5m 27.65n 0 32.5n 0 \
*33.9n 5m 63.75n 5m 65.15n 0 45n 0 46.4n 5m 51.25n 5m 52.65n 0 \
*57.5n 0 58.9n 5m 63.75n 5m 65.15n 0
*16019 603 0 pwl 0 9m 20n 9m 21.4n 0 26.25n 0 27.65n 9m 32.5n 9m \
*33.9n 0 38.75n 0 40.15n 9m 45n 9m 46.4n 0 51.25n 0 52.65n 9m 57.5n 9m \
*58.9n 0 63.75n 0 65.15n 9m
*r6019 601 0 1k
*16029 vcc 604 pwl 0 9m 20n 9m 21.4n 0 26.25n 0 27.65n 9m 32.5n 9m \
*33.9n 0 38.75n 0 40.15n 9m 45n 9m 46.4n 0 51.25n 0 52.65n 9m 57.5n 9m \
*58.9n 0 63.75n 0 65.15n 9m
*16025 604 0 pwl 0 0 20n 0 21.4n 5m 26.25n 5m 27.65n 0 32.5n 0 \
*33.9n 5m 63.75n 5m 65.15n 0 45n 0 46.4n 5m 51.25n 5m 52.65n 0 \
*57.5n 0 58.9n 5m 63.75n 5m 65.15n 0
*i6055 vcc 605 pwl 0 0 20n 0 21.4n 5m 26.25n 5m 27.65n 0 32.5n 0 \
*33.9n 5m 63.75n 5m 65.15n 0 45n 0 46.4n 5m 51.25n 5m 52.65n 0 \
*57.5n 0 58.9n 5m 63.75n 5m 65.15n 0
*16059 605 0 pwl 0 9m 20n 9m 21.4n 0 26.25n 0 27.65n 9m 32.5n 9m \
*33.9n 0 38.75n 0 40.15n 9m 45n 9m 46.4n 0 51.25n 0 52.65n 9m 57.5n 9m \
*58.9n 0 63.75n 0 65.15n 9m
*r6059 605 0 1k
*i6069 vcc 606 pwl 0 9m 20n 9m 21.4n 0 26.25n 0 27.65n 9m 32.5n 9m \
*33.9n 0 38.75n 0 40.15n 9m 45n 9m 46.4n 0 51.25n 0 52.65n 9m 57.5n 9m \
*58.9n 0 63.75n 0 65.15n 9m
*i6065 606 0 pwl 0 0 20n 0 21.4n 5m 26.25n 5m 27.65n 0 32.5n 0 \
*33.9n 5m 63.75n 5m 65.15n 0 45n 0 46.4n 5m 51.25n 5m 52.65n 0 \
*57.5n 0 58.9n 5m 63.75n 5m 65.15n 0
*r6065 606 0 1k
*r6039 603 0 1k
*r6045 604 0 1k
rin 603 901 52
irin vcc 603 lma
rinn 604 901 52
irinn 604 0 lma
vcc vcc 0 5
rincom 901 905 125
vrin 905 0 1.25
routp 639 902 52
iroutp vcc 639 lma
routn 640 902 52
iroutn 640 0 lma
roucom 902 906 125
vrout 906 0 1.25
cinp 603 0 5p
cinn 604 0 5p
coutp 639 0 5p
coutn 640 0 5p
r601 601 910 52
i601 vcc 601 lma
c601 601 0 5p
r602 602 910 52
i602 602 0 lma
c602 602 0 5p
r601602 910 911 125
v911 911 0 1.25
** UMESH CHANDRA
6/9/00
SEAGATE TECHNOLOGY
```

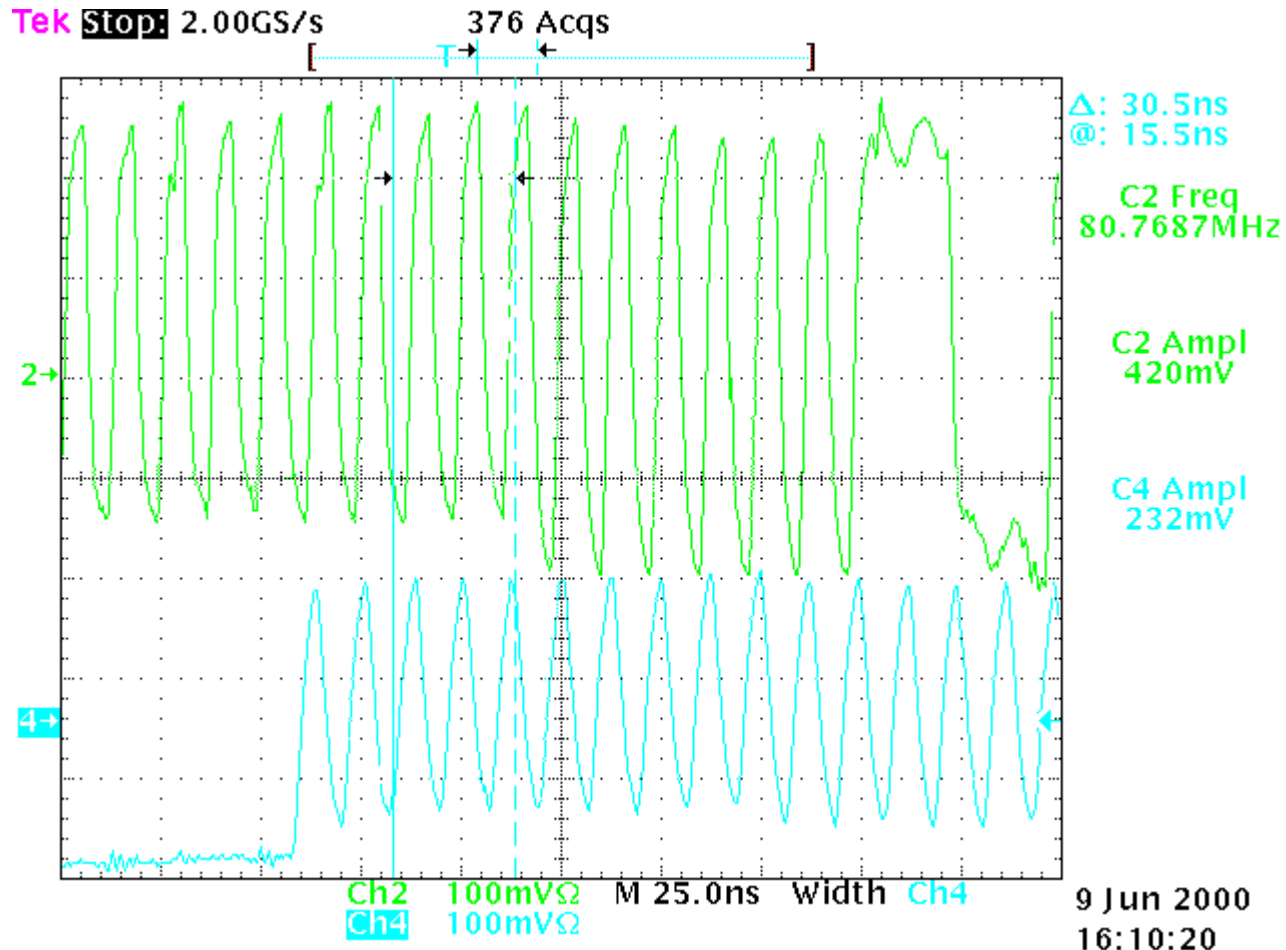
Hspice Simulation - 12 m Amphenol



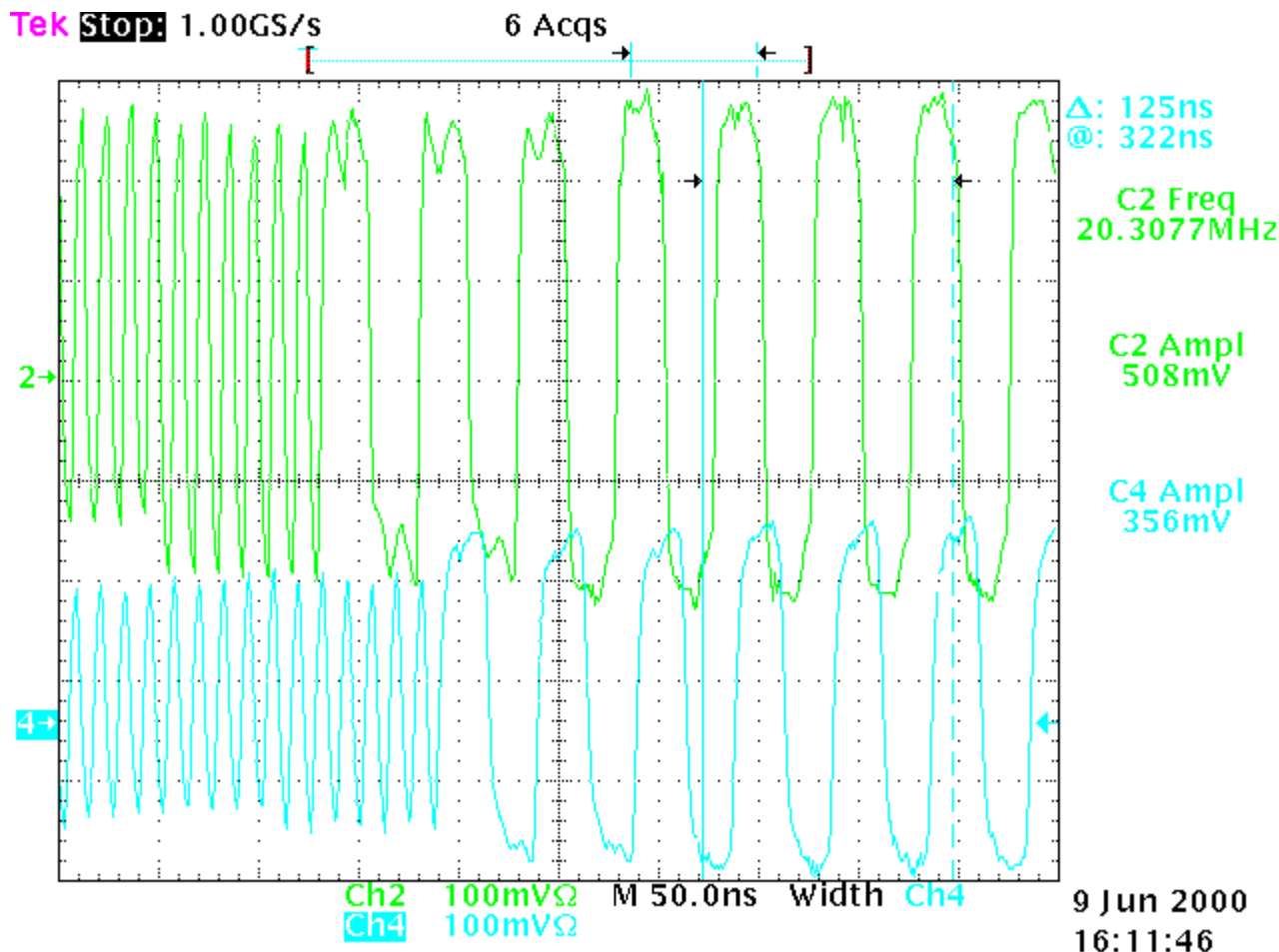
Hspice Simulation - 12 m Amphenol



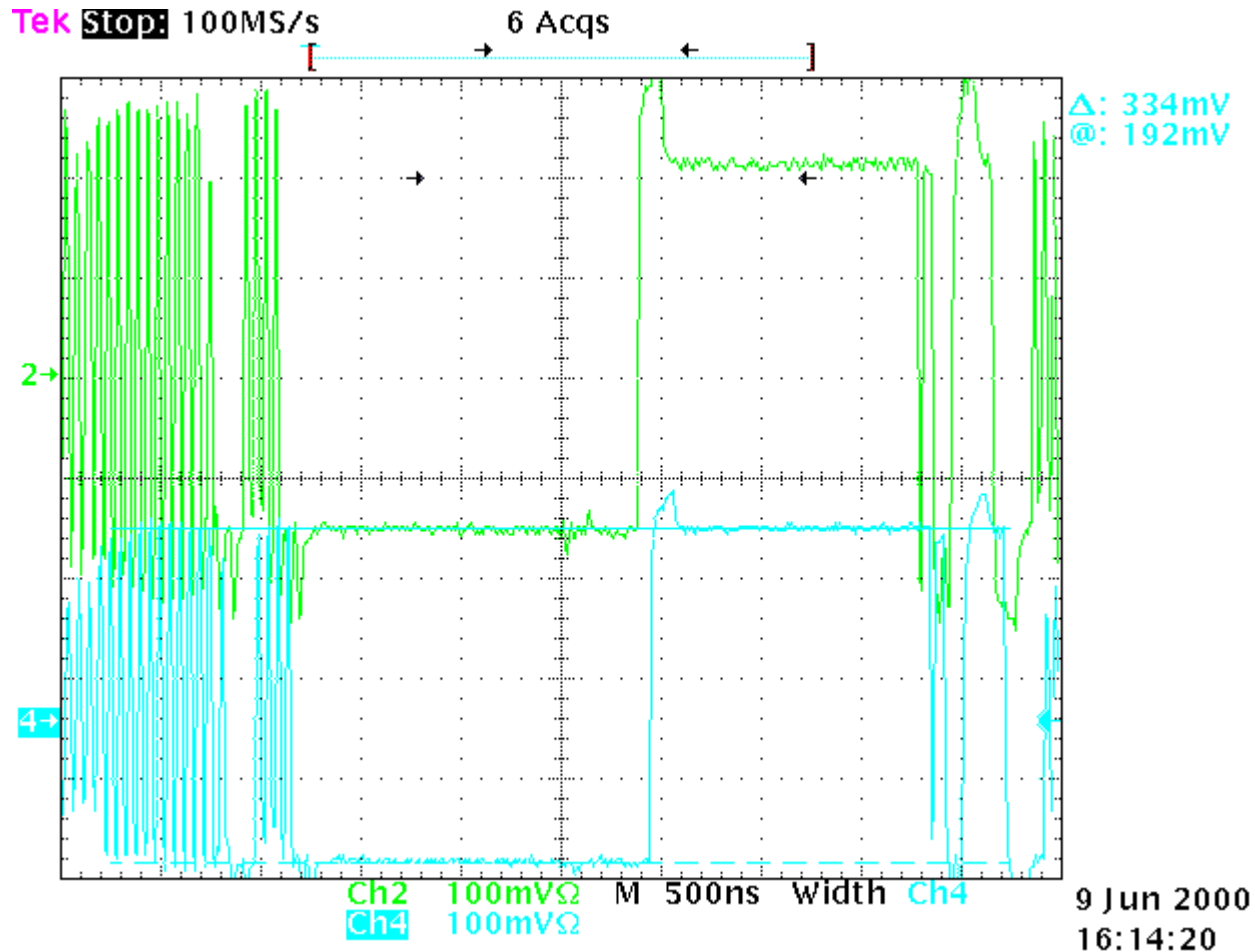
Test Chip - 12 m of Amphenol, 80 MHz



Test Chip - 12 m Amphenol, 20 MHz



Test Chip - DC Level, Output



Test Chip - DC Level, Input

