Digital optical links
Evaluation
Report

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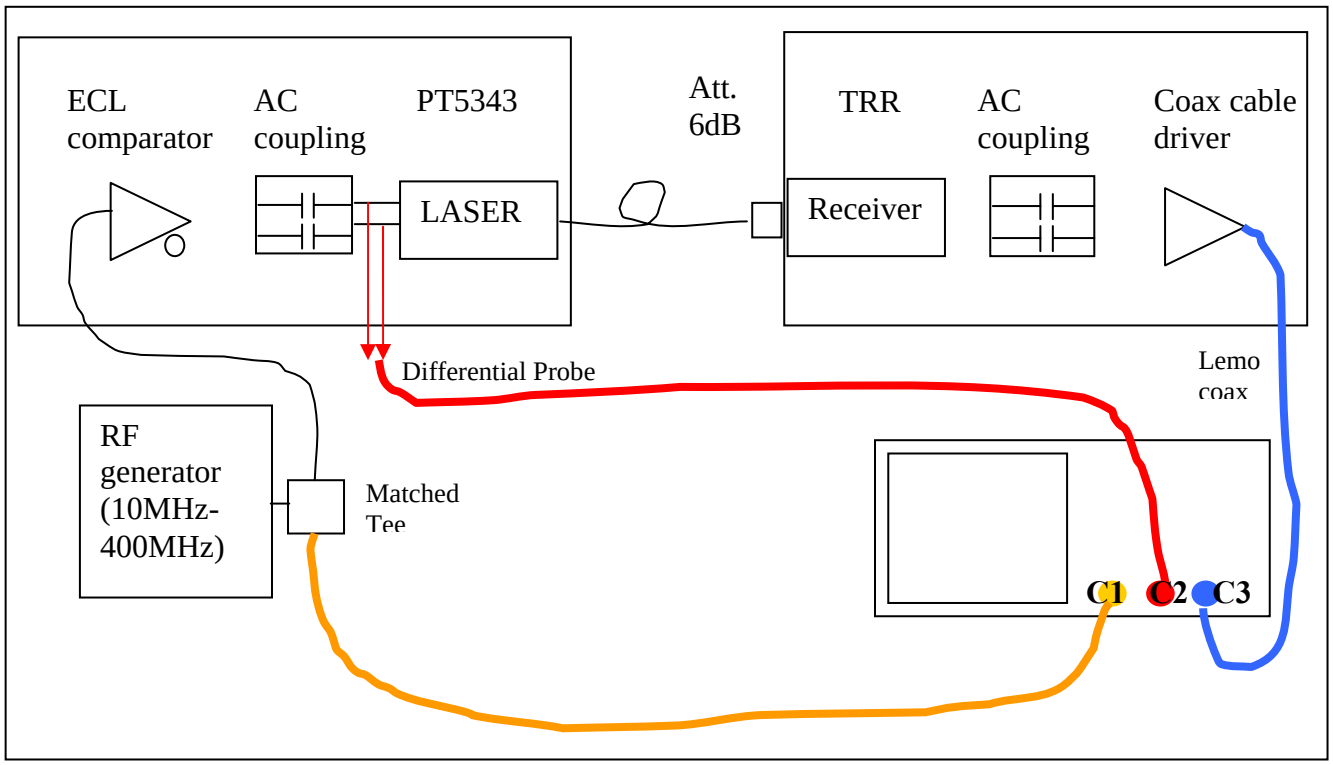
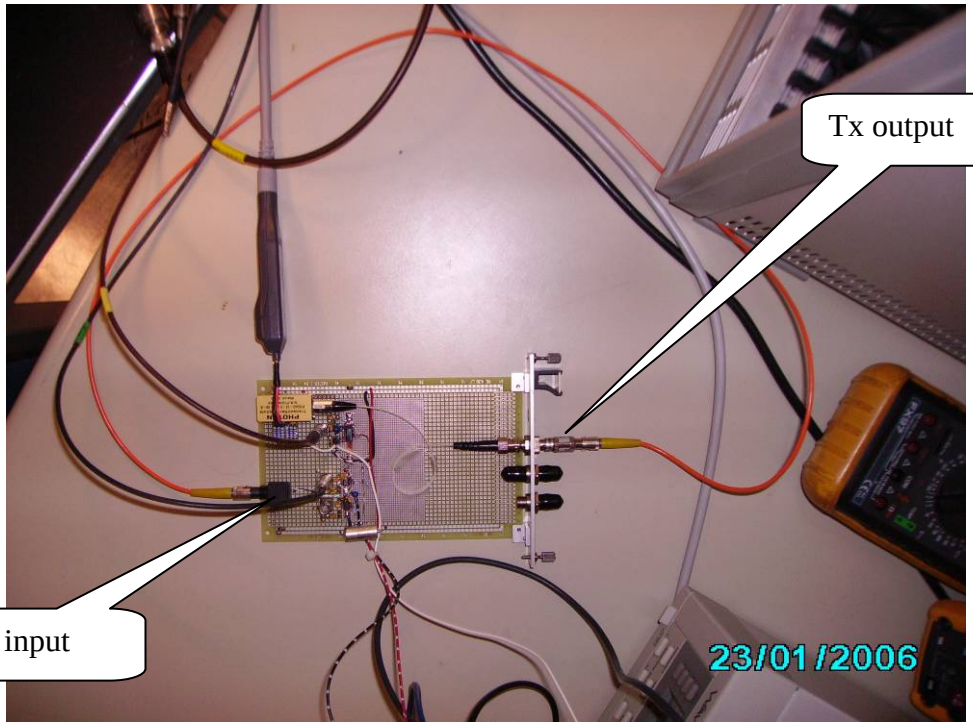
I. JITTER MEASUREMENT USING A DIGITAL SCOPE

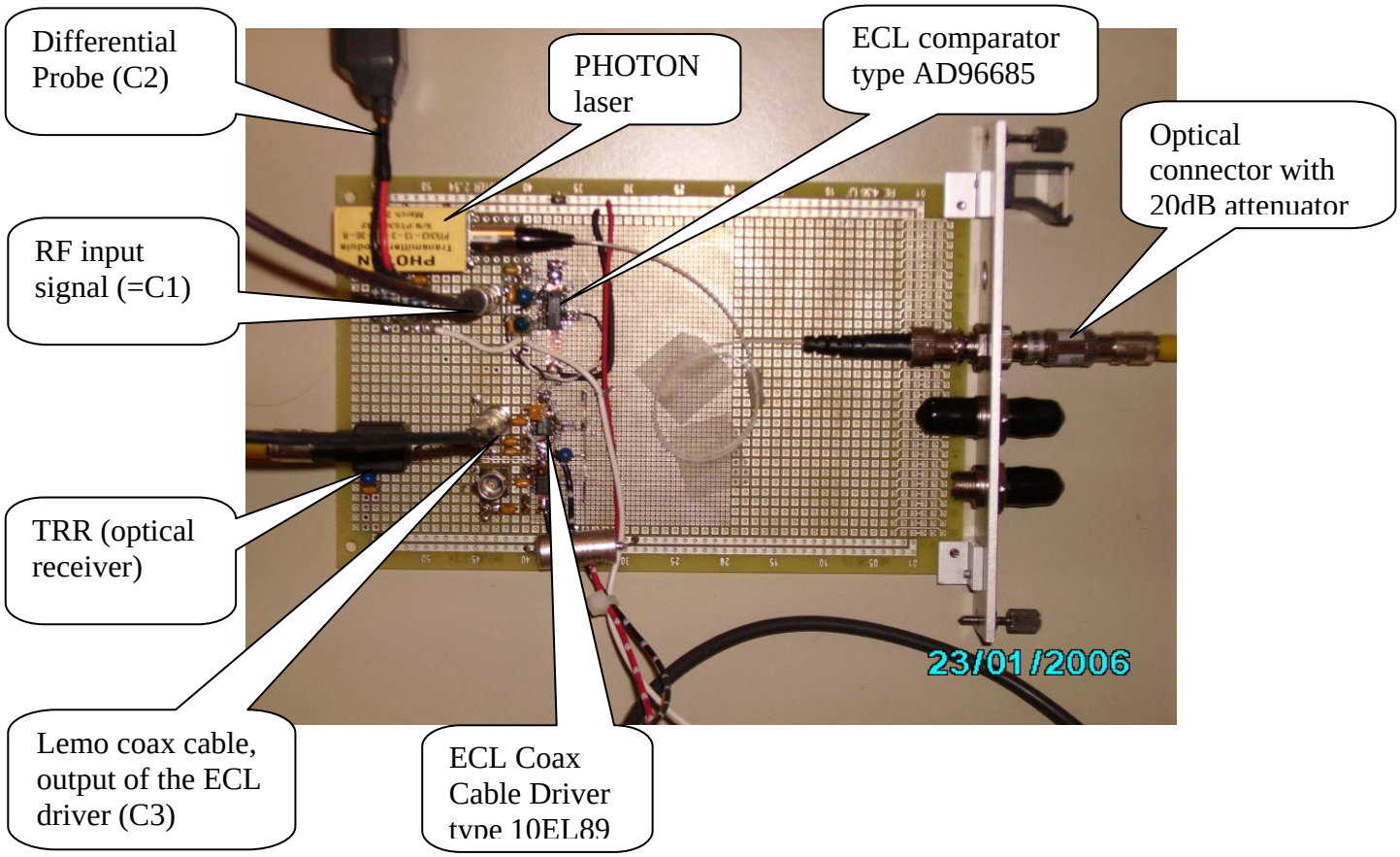
A. *Setup:*

- One RF generator – 100kHz-2000MHz - HP 8648B for the 3 RF signals 10MHz, 40MHz, 400MHz.
- 1 tester board equipped with typical TTC components:
  - One ECL comparator (AD96685)
  - One PHOTON ECL laser (0-300MHz), type PT5343 (the input is AC coupled)
  - One optical fiber (single mode, ST/PC)
  - One 20dB attenuator
  - One Optical receiver type TRR-1B43-000 (0-115MHz)
  - One ECL coax cable driver type MC100EL89 (the input is AC coupled)
- 1 Lecroy oscilloscope type Wavepro 7100 1GHz
- 1 Generator type Tektronics AFG3252 240MHz for the 5ns pulses



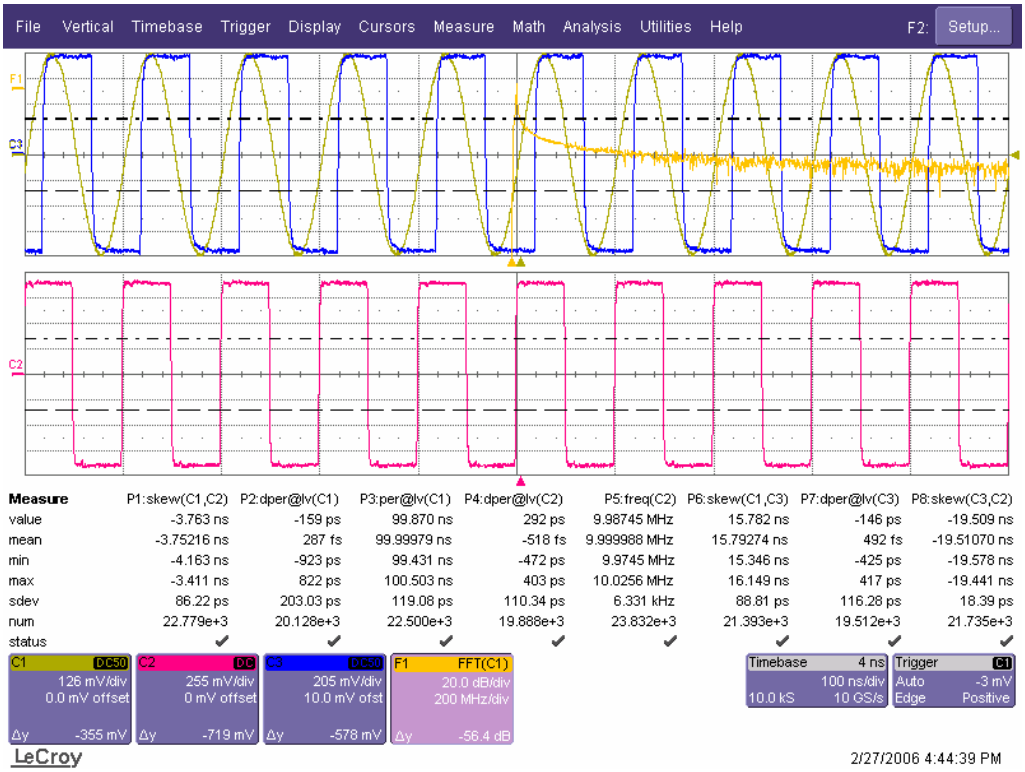
'Digital' Optical Transmission Tester Board



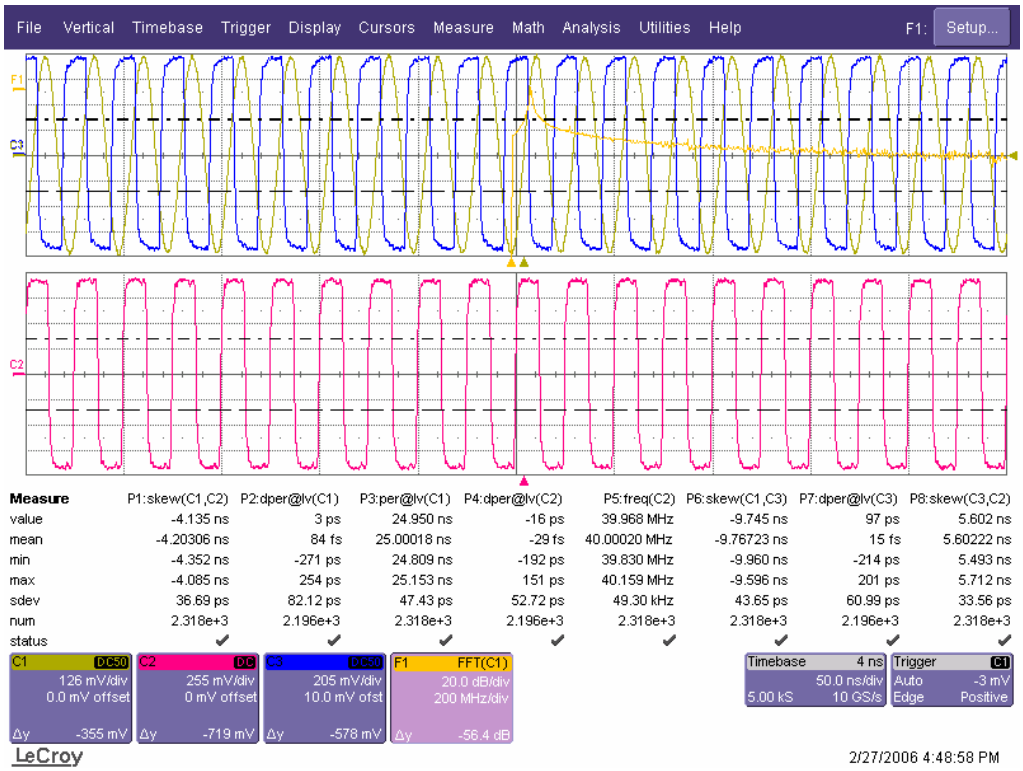


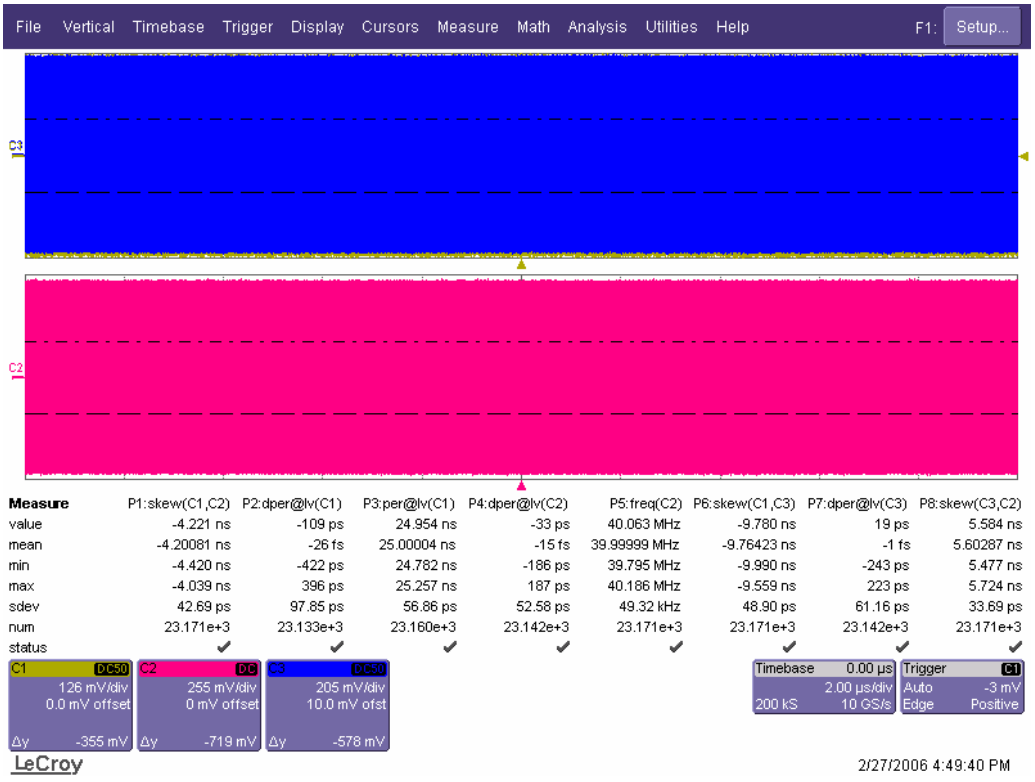
B. Results

1. 10 MHz



2. 40 MHz


File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help F1: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value -4.135 ns 3 ps 24.950 ns -16 ps 39.968 MHz -9.745 ns 97 ps 5.602 ns
mean -4.20306 ns 84 fs 25.00018 ns -29 fs 40.00020 MHz -9.76723 ns 15 fs 5.60222 ns
min -4.352 ns -271 ps 24.809 ns -192 ps 39.830 MHz -9.960 ns -214 ps 5.493 ns
max -4.085 ns 254 ps 25.153 ns 151 ps 40.159 MHz -9.596 ns 201 ps 5.712 ns
sdev 36.69 ps 82.12 ps 47.43 ps 52.72 ps 49.30 kHz 43.65 ps 60.99 ps 33.56 ps
num 2.318e+3 2.196e+3 2.318e+3 2.196e+3 2.318e+3 2.318e+3 2.196e+3 2.318e+3
status
C1 DC50 126 mV/div 0.0 mV offset Δy -355 mV
C2 DC 255 mV/div 0 mV offset Δy -719 mV
C3 DC50 205 mV/div 10.0 mV ofst Δy -578 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 4 ns 50.0 ns/div 5.00 kS 10 GS/s
Trigger C1 Auto -3 mV Edge Positive
LeCroy
2/27/2006 4:48:58 PM


File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help F1: Setup...
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value -4.221 ns -109 ps 24.954 ns -33 ps 40.063 MHz -9.780 ns 19 ps 5.584 ns
mean -4.20081 ns -26 fs 25.00004 ns -15 fs 39.99999 MHz -9.76423 ns -1 fs 5.60287 ns
min -4.420 ns -422 ps 24.782 ns -186 ps 39.795 MHz -9.990 ns -243 ps 5.477 ns
max -4.039 ns 396 ps 25.257 ns 187 ps 40.186 MHz -9.559 ns 223 ps 5.724 ns
sdev 42.69 ps 97.85 ps 56.86 ps 52.58 ps 49.32 kHz 48.90 ps 61.16 ps 33.69 ps
num 23.171e+3 23.133e+3 23.160e+3 23.142e+3 23.171e+3 23.171e+3 23.142e+3 23.171e+3
status
C1 DC50 126 mV/div 0.0 mV offset Δy -355 mV
C2 DC 255 mV/div 0 mV offset Δy -719 mV
C3 DC50 205 mV/div 10.0 mV ofst Δy -578 mV
Timebase 0.00 µs 2.00 µs/div 200 kS 10 GS/s
Trigger C1 Auto -3 mV Edge Positive
LeCroy
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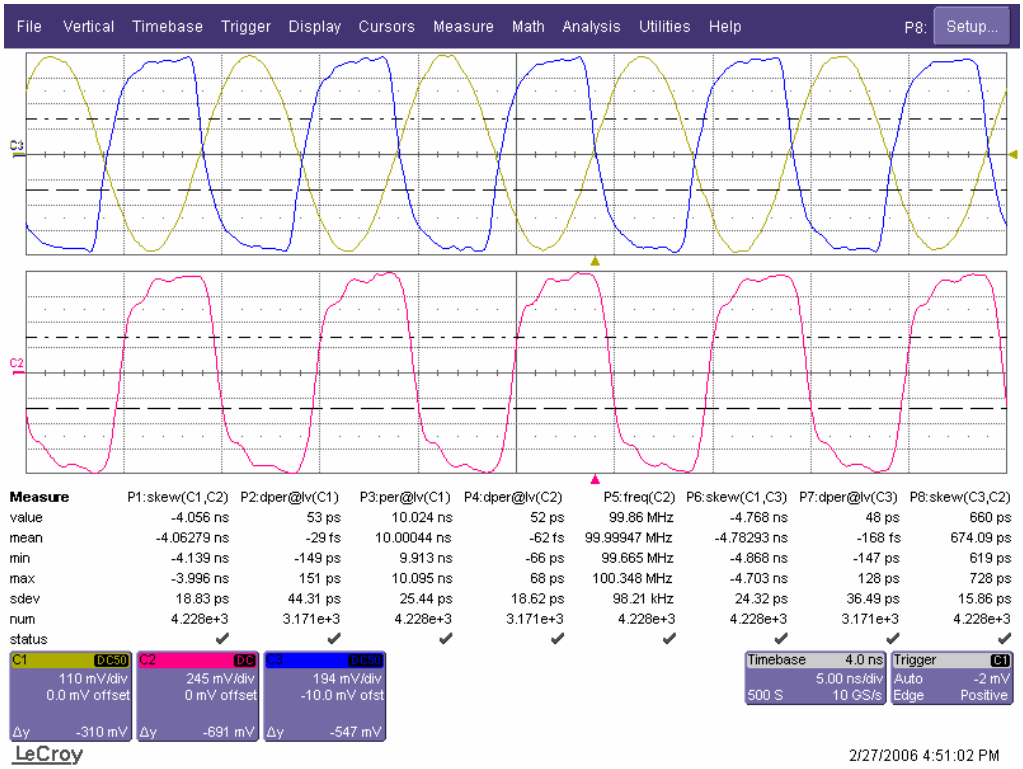
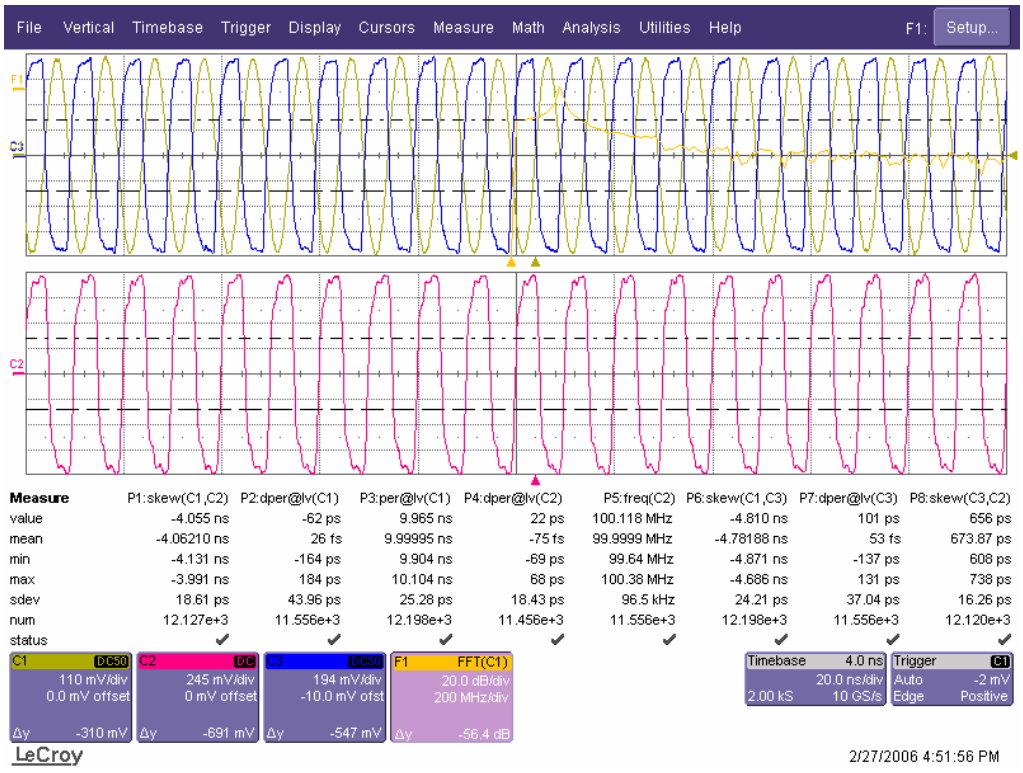
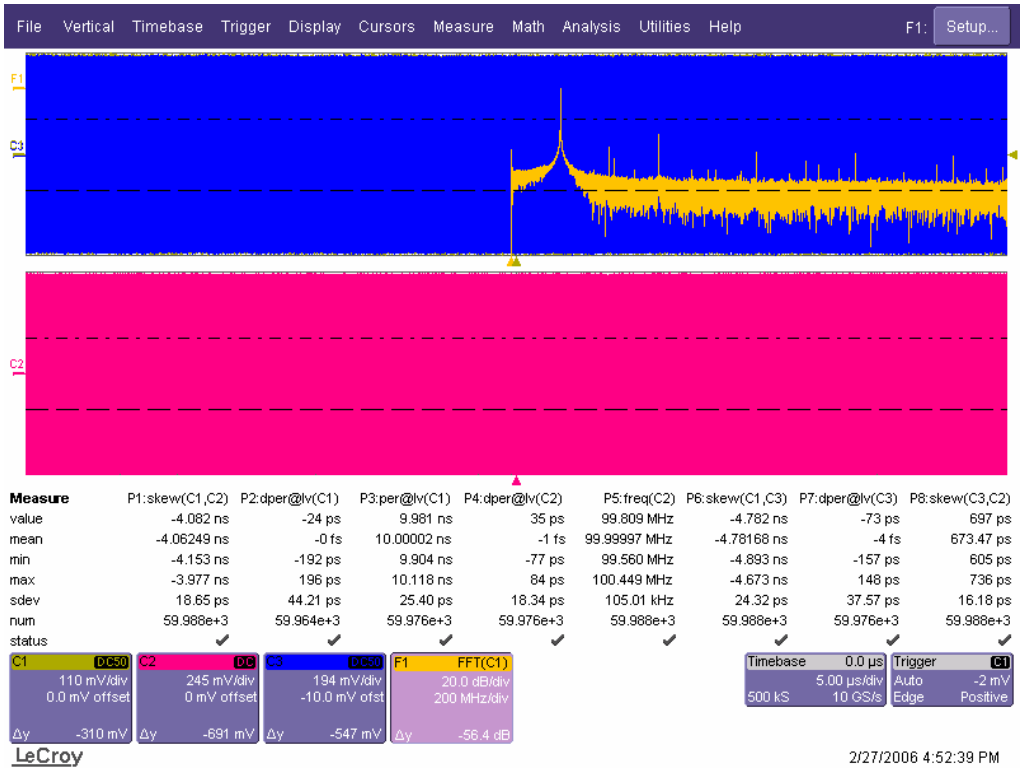
3. 100 MHz


File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help
P8: Setup...
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value -4.056 ns 53 ps 10.024 ns 52 ps 99.86 MHz -4.768 ns 48 ps 660 ps
mean -4.06279 ns -29 fs 10.00044 ns -62 fs 99.99947 MHz -4.78293 ns -168 fs 674.09 ps
min -4.139 ns -149 ps 9.913 ns -66 ps 99.665 MHz -4.868 ns -147 ps 619 ps
max -3.996 ns 151 ps 10.095 ns 68 ps 100.348 MHz -4.703 ns 128 ps 728 ps
sdev 18.83 ps 44.31 ps 25.44 ps 18.62 ps 98.21 kHz 24.32 ps 36.49 ps 15.86 ps
num 4.228e+3 3.171e+3 4.228e+3 3.171e+3 4.228e+3 4.228e+3 3.171e+3 4.228e+3
status
C1 DC50 110 mV/div 0.0 mV offset Δy -310 mV
C2 DC 245 mV/div 0 mV offset Δy -691 mV
C3 DC50 194 mV/div -10.0 mV ofst Δy -547 mV
Timebase 4.0 ns 5.00 ns/div 500 S 10 GS/s
Trigger C1 Auto -2 mV Edge Positive
LeCroy
2/27/2006 4:51:02 PM


File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help
F1: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value -4.055 ns -62 ps 9.965 ns 22 ps 100.118 MHz -4.810 ns 101 ps 656 ps
mean -4.06210 ns 26 fs 9.99995 ns -75 fs 99.9999 MHz -4.78188 ns 53 fs 673.87 ps
min -4.131 ns -164 ps 9.904 ns -69 ps 99.64 MHz -4.871 ns -137 ps 608 ps
max -3.991 ns 184 ps 10.104 ns 68 ps 100.38 MHz -4.686 ns 131 ps 738 ps
sdev 18.61 ps 43.96 ps 25.28 ps 18.43 ps 96.5 kHz 24.21 ps 37.04 ps 16.26 ps
num 12.127e+3 11.556e+3 12.198e+3 11.456e+3 11.556e+3 12.198e+3 11.556e+3 12.120e+3
status
C1 DC50 110 mV/div 0.0 mV offset Δy -310 mV
C2 DC 245 mV/div 0 mV offset Δy -691 mV
C3 DC50 194 mV/div -10.0 mV ofst Δy -547 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 4.0 ns 20.0 ns/div 2.00 kS 10 GS/s
Trigger C1 Auto -2 mV Edge Positive
LeCroy
2/27/2006 4:51:56 PM


File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help F1: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value -4.082 ns -24 ps 9.981 ns 35 ps 99.809 MHz -4.782 ns -73 ps 697 ps
mean -4.06249 ns -0 fs 10.00002 ns -1 fs 99.99997 MHz -4.78168 ns -4 fs 673.47 ps
min -4.153 ns -192 ps 9.904 ns -77 ps 99.560 MHz -4.893 ns -157 ps 605 ps
max -3.977 ns 196 ps 10.118 ns 84 ps 100.449 MHz -4.673 ns 148 ps 736 ps
sdev 18.65 ps 44.21 ps 25.40 ps 18.34 ps 105.01 kHz 24.32 ps 37.57 ps 16.18 ps
num 59.988e+3 59.964e+3 59.976e+3 59.976e+3 59.988e+3 59.988e+3 59.976e+3 59.988e+3
status
C1 DC50 110 mV/div 0.0 mV offset Δy -310 mV
C2 DC 245 mV/div 0 mV offset Δy -691 mV
C3 DC50 194 mV/div -10.0 mV ofst Δy -547 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 0.0 µs 5.00 µs/div 500 kS 10 GS/s
Trigger C1 Auto -2 mV Edge Positive
LeCroy
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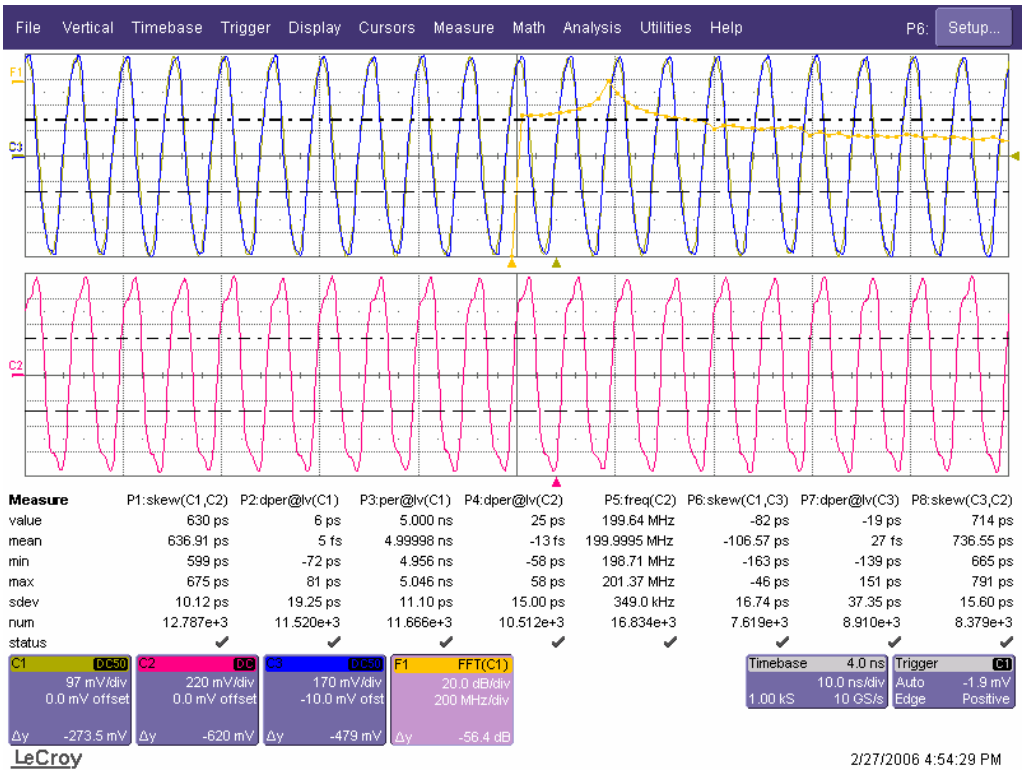
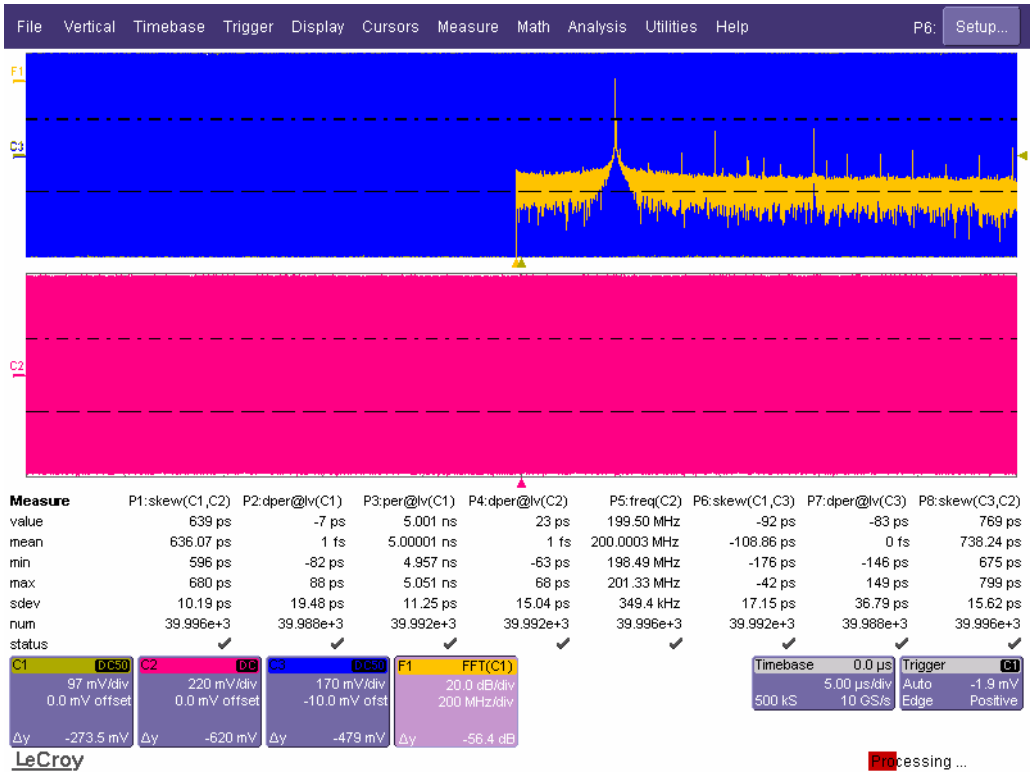
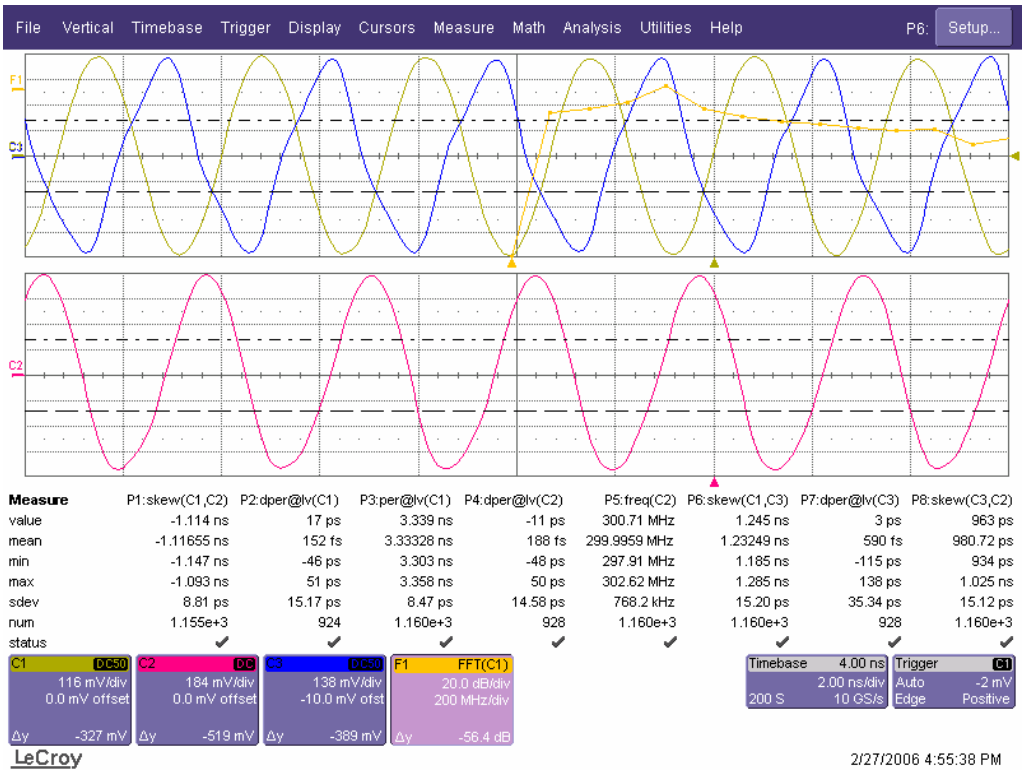
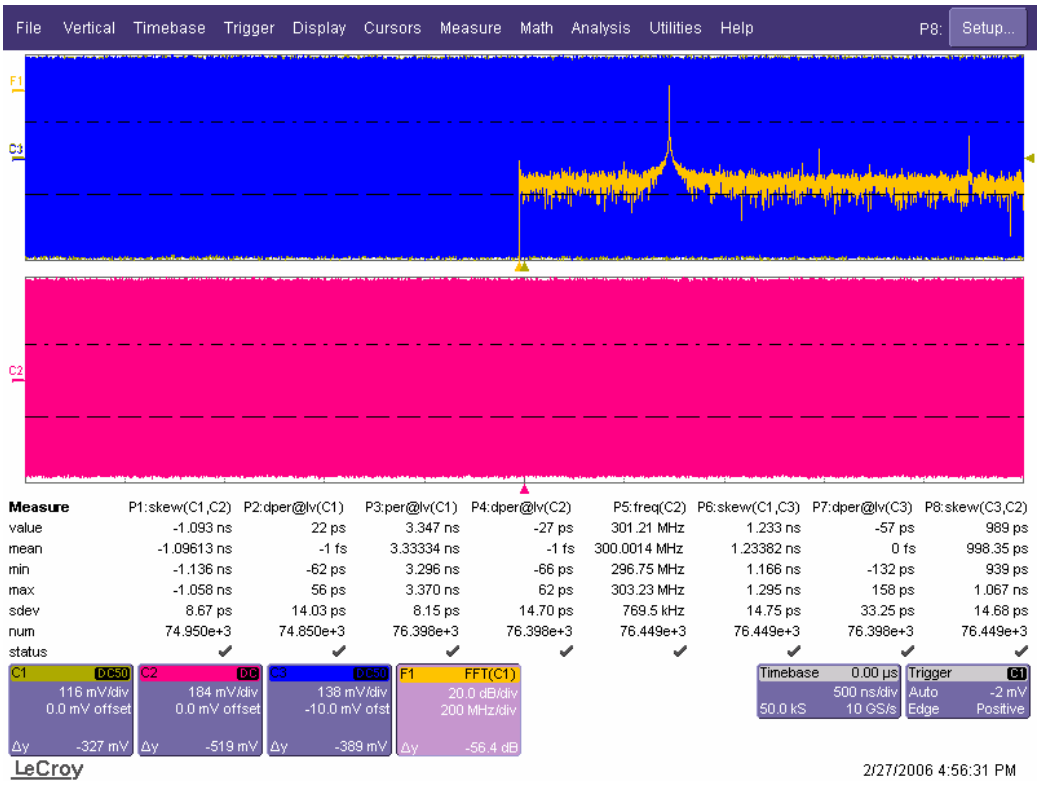
4. 200MHz


File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help P6: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value 630 ps 6 ps 5.000 ns 25 ps 199.64 MHz -82 ps -19 ps 714 ps
mean 636.91 ps 5 fs 4.99998 ns -13 fs 199.9995 MHz -106.57 ps 27 fs 736.55 ps
min 599 ps -72 ps 4.956 ns -58 ps 198.71 MHz -163 ps -139 ps 665 ps
max 675 ps 81 ps 5.046 ns 58 ps 201.37 MHz -46 ps 151 ps 791 ps
sdev 10.12 ps 19.25 ps 11.10 ps 15.00 ps 349.0 kHz 16.74 ps 37.35 ps 15.60 ps
num 12.787e+3 11.520e+3 11.666e+3 10.512e+3 16.834e+3 7.619e+3 8.910e+3 8.379e+3
status
C1 DC50 97 mV/div 0.0 mV offset Δy -273.5 mV
C2 DC 220 mV/div 0.0 mV offset Δy -620 mV
C3 DC50 170 mV/div -10.0 mV ofst Δy -479 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 4.0 ns 10.0 ns/div 1.00 kS 10 GS/s
Trigger C1 Auto -1.9 mV Edge Positive
LeCroy
2/27/2006 4:54:29 PM

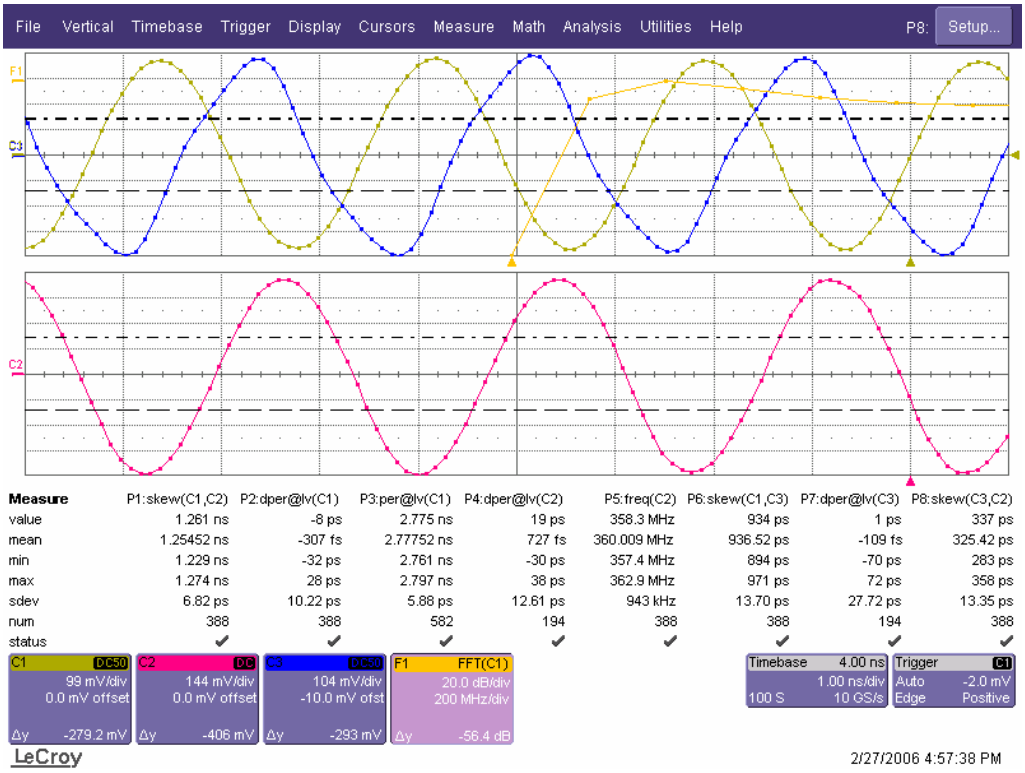

File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help P6: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value 639 ps -7 ps 5.001 ns 23 ps 199.50 MHz -92 ps -83 ps 769 ps
mean 636.07 ps 1 fs 5.00001 ns 1 fs 200.0003 MHz -108.86 ps 0 fs 738.24 ps
min 596 ps -82 ps 4.957 ns -63 ps 198.49 MHz -176 ps -146 ps 675 ps
max 680 ps 88 ps 5.051 ns 68 ps 201.33 MHz -42 ps 149 ps 799 ps
sdev 10.19 ps 19.48 ps 11.25 ps 15.04 ps 349.4 kHz 17.15 ps 36.79 ps 15.62 ps
num 39.996e+3 39.988e+3 39.992e+3 39.992e+3 39.996e+3 39.992e+3 39.988e+3 39.996e+3
status
C1 DC50 97 mV/div 0.0 mV offset Δy -273.5 mV
C2 DC 220 mV/div 0.0 mV offset Δy -620 mV
C3 DC50 170 mV/div -10.0 mV ofst Δy -479 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 0.0 µs 5.00 µs/div 500 kS 10 GS/s
Trigger C1 Auto -1.9 mV Edge Positive
LeCroy
Processing ...

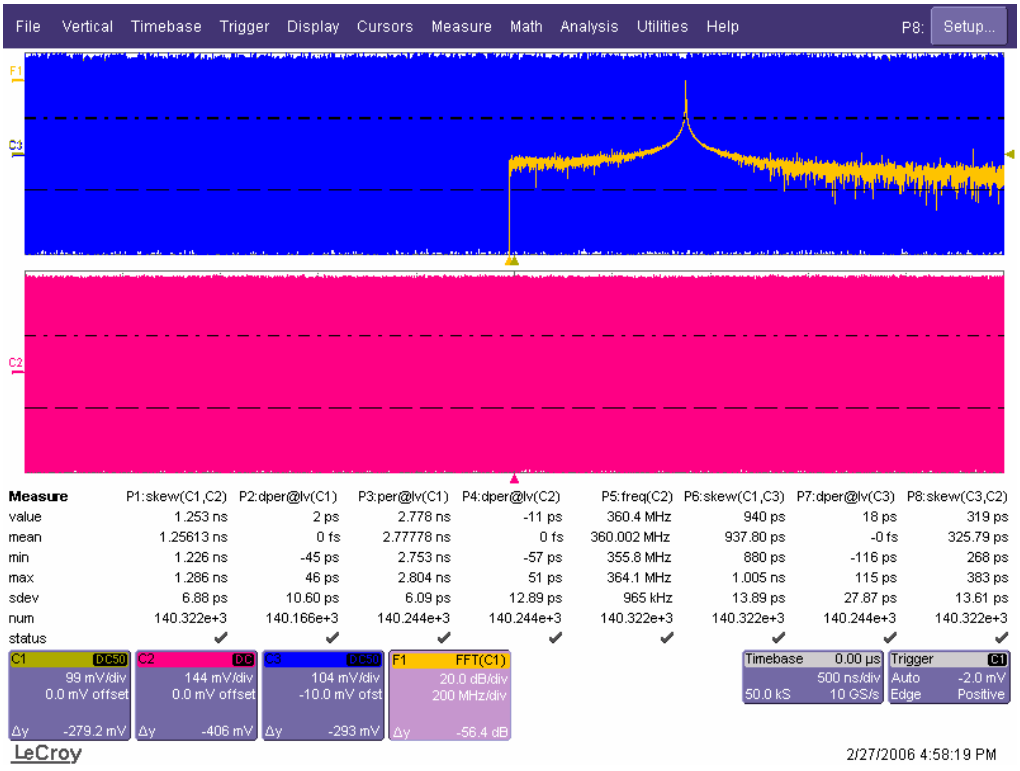
5. 300 MHz


File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help P6: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value -1.114 ns 17 ps 3.339 ns -11 ps 300.71 MHz 1.245 ns 3 ps 963 ps
mean -1.11655 ns 152 fs 3.33328 ns 188 fs 299.9959 MHz 1.23249 ns 590 fs 980.72 ps
min -1.147 ns -46 ps 3.303 ns -48 ps 297.91 MHz 1.185 ns -115 ps 934 ps
max -1.093 ns 51 ps 3.358 ns 50 ps 302.62 MHz 1.285 ns 138 ps 1.025 ns
sdev 8.81 ps 15.17 ps 8.47 ps 14.58 ps 768.2 kHz 15.20 ps 35.34 ps 15.12 ps
num 1.155e+3 924 1.160e+3 928 1.160e+3 1.160e+3 928 1.160e+3
status
C1 DC50 116 mV/div 0.0 mV offset Δy -327 mV
C2 DC 184 mV/div 0.0 mV offset Δy -519 mV
C3 DC50 138 mV/div -10.0 mV ofst Δy -389 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 4.00 ns 2.00 ns/div 200 S 10 GS/s
Trigger C1 Auto -2 mV Edge Positive
LeCroy
2/27/2006 4:55:38 PM

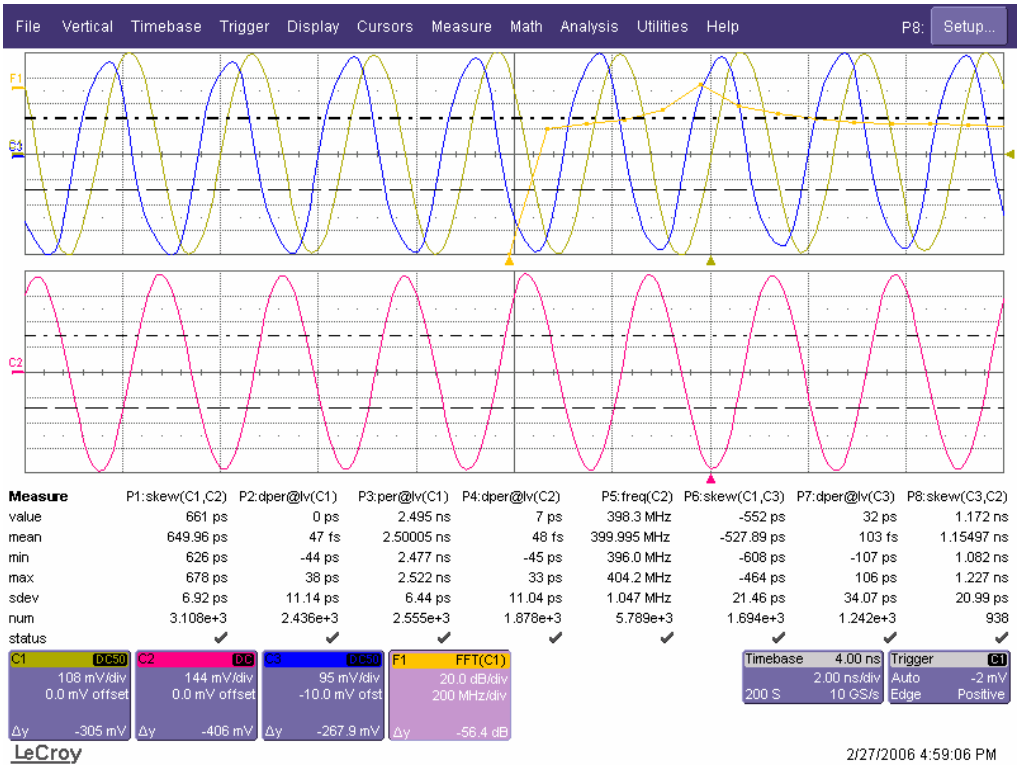

File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help P8: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value -1.093 ns 22 ps 3.347 ns -27 ps 301.21 MHz 1.233 ns -57 ps 989 ps
mean -1.09613 ns -1 fs 3.33334 ns -1 fs 300.0014 MHz 1.23382 ns 0 fs 998.35 ps
min -1.136 ns -62 ps 3.296 ns -66 ps 296.75 MHz 1.166 ns -132 ps 939 ps
max -1.058 ns 56 ps 3.370 ns 62 ps 303.23 MHz 1.295 ns 158 ps 1.067 ns
sdev 8.67 ps 14.03 ps 8.15 ps 14.70 ps 769.5 kHz 14.75 ps 33.25 ps 14.68 ps
num 74.950e+3 74.850e+3 76.398e+3 76.398e+3 76.449e+3 76.449e+3 76.398e+3 76.449e+3
status
C1 DC50 116 mV/div 0.0 mV offset Δy -327 mV
C2 DC 184 mV/div 0.0 mV offset Δy -519 mV
C3 DC50 138 mV/div -10.0 mV ofst Δy -389 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 0.00 µs 500 ns/div 50.0 kS 10 GS/s
Trigger C1 Auto -2 mV Edge Positive
LeCroy
2/27/2006 4:56:31 PM

6. 360 MHz


File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help P8: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value 1.261 ns -8 ps 2.775 ns 19 ps 358.3 MHz 934 ps 1 ps 337 ps
mean 1.25452 ns -307 fs 2.77752 ns 727 fs 360.009 MHz 936.52 ps -109 fs 325.42 ps
min 1.229 ns -32 ps 2.761 ns -30 ps 357.4 MHz 894 ps -70 ps 283 ps
max 1.274 ns 28 ps 2.797 ns 38 ps 362.9 MHz 971 ps 72 ps 358 ps
sdev 6.82 ps 10.22 ps 5.88 ps 12.61 ps 943 kHz 13.70 ps 27.72 ps 13.35 ps
num 388 388 582 194 388 388 194 388
status
C1 DC50 99 mV/div 0.0 mV offset Δy -279.2 mV
C2 DC 144 mV/div 0.0 mV offset Δy -406 mV
C3 DC50 104 mV/div -10.0 mV ofst Δy -293 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 4.00 ns 1.00 ns/div 100 S 10 GS/s
Trigger C1 Auto -2.0 mV Edge Positive
LeCroy
2/27/2006 4:57:38 PM


File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help P8: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value 1.253 ns 2 ps 2.778 ns -11 ps 360.4 MHz 940 ps 18 ps 319 ps
mean 1.25613 ns 0 fs 2.77778 ns 0 fs 360.002 MHz 937.80 ps -0 fs 325.79 ps
min 1.226 ns -45 ps 2.753 ns -57 ps 355.8 MHz 880 ps -116 ps 268 ps
max 1.286 ns 46 ps 2.804 ns 51 ps 364.1 MHz 1.005 ns 115 ps 383 ps
sdev 6.88 ps 10.60 ps 6.09 ps 12.89 ps 965 kHz 13.89 ps 27.87 ps 13.61 ps
num 140.322e+3 140.166e+3 140.244e+3 140.244e+3 140.322e+3 140.322e+3 140.244e+3 140.322e+3
status
C1 DC50 99 mV/div 0.0 mV offset Δy -279.2 mV
C2 DC 144 mV/div 0.0 mV offset Δy -406 mV
C3 DC50 104 mV/div -10.0 mV ofst Δy -293 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 0.00 µs 500 ns/div 50.0 kS 10 GS/s
Trigger C1 Auto -2.0 mV Edge Positive
LeCroy
2/27/2006 4:58:19 PM

7. 400 MHz


File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help
P8: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value 661 ps 0 ps 2.495 ns 7 ps 398.3 MHz -552 ps 32 ps 1.172 ns
mean 649.96 ps 47 fs 2.50005 ns 48 fs 399.995 MHz -527.89 ps 103 fs 1.15497 ns
min 626 ps -44 ps 2.477 ns -45 ps 396.0 MHz -608 ps -107 ps 1.082 ns
max 678 ps 38 ps 2.522 ns 33 ps 404.2 MHz -464 ps 106 ps 1.227 ns
sdev 6.92 ps 11.14 ps 6.44 ps 11.04 ps 1.047 MHz 21.46 ps 34.07 ps 20.99 ps
num 3.108e+3 2.436e+3 2.555e+3 1.878e+3 5.789e+3 1.694e+3 1.242e+3 938
status
C1 DC50 108 mV/div 0.0 mV offset Δy -305 mV
C2 DC 144 mV/div 0.0 mV offset Δy -406 mV
C3 DC50 95 mV/div -10.0 mV ofst Δy -267.9 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 4.00 ns 2.00 ns/div 200 S 10 GS/s
Trigger C1 Auto -2 mV Edge Positive
LeCroy
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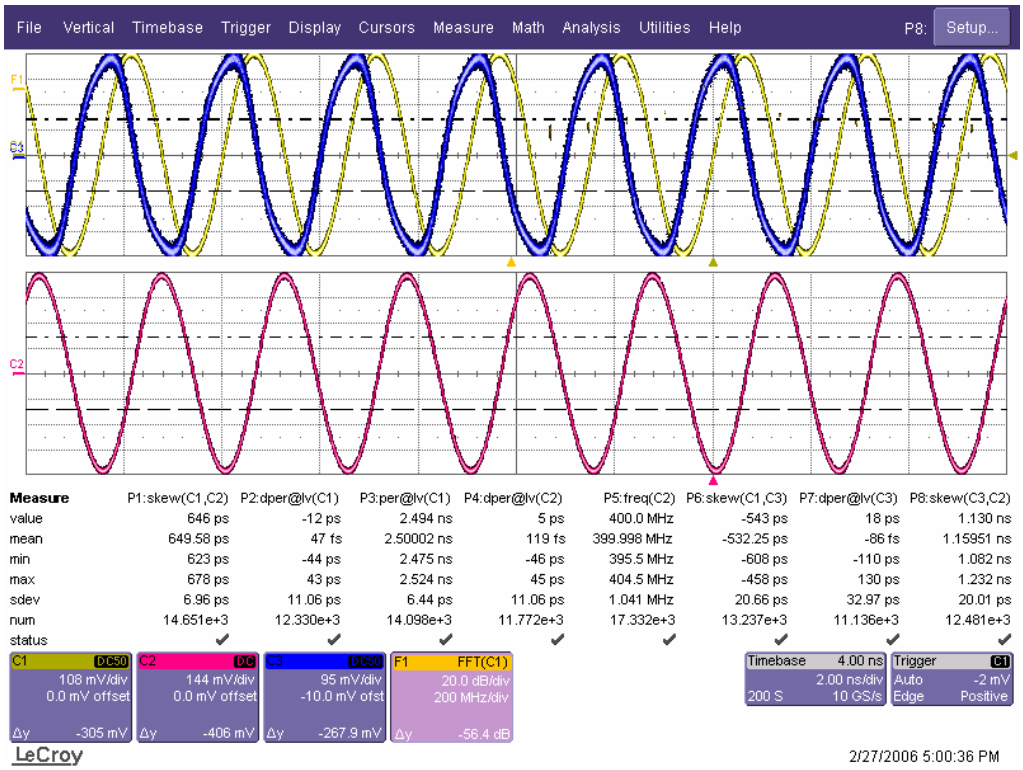
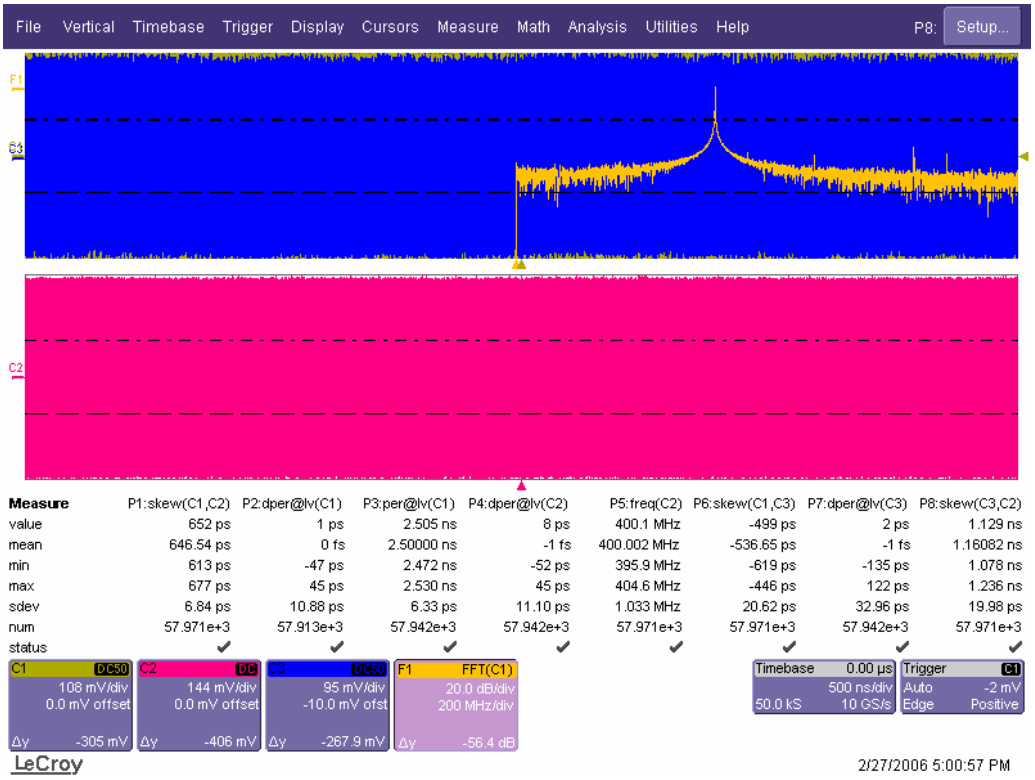
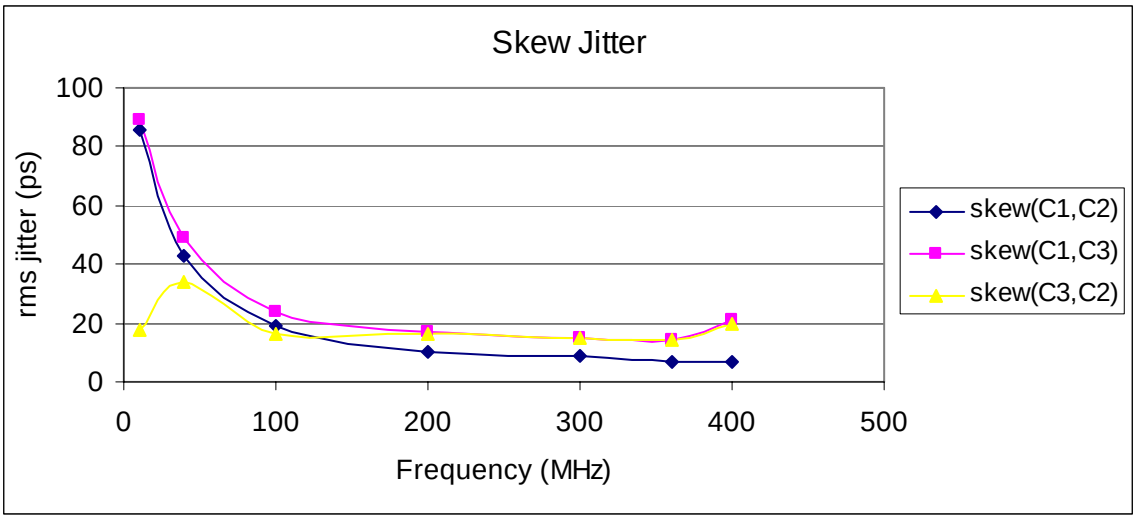
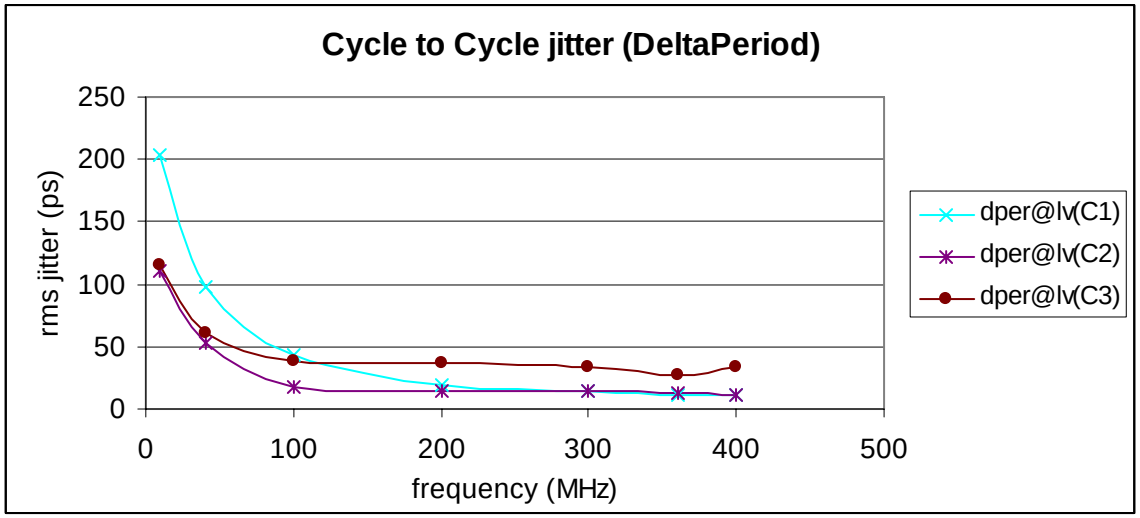

File Vertical Timebase Trigger Display Cursors Measure Math Analysis Utilities Help
P8: Setup...
F1
C3
C2
Measure P1:skew(C1,C2) P2:dper@lv(C1) P3:per@lv(C1) P4:dper@lv(C2) P5:freq(C2) P6:skew(C1,C3) P7:dper@lv(C3) P8:skew(C3,C2)
value 646 ps -12 ps 2.494 ns 5 ps 400.0 MHz -543 ps 18 ps 1.130 ns
mean 649.58 ps 47 fs 2.50002 ns 119 fs 399.998 MHz -532.25 ps -86 fs 1.15951 ns
min 623 ps -44 ps 2.475 ns -46 ps 395.5 MHz -608 ps -110 ps 1.082 ns
max 678 ps 43 ps 2.524 ns 45 ps 404.5 MHz -458 ps 130 ps 1.232 ns
sdev 6.96 ps 11.06 ps 6.44 ps 11.06 ps 1.041 MHz 20.66 ps 32.97 ps 20.01 ps
num 14.651e+3 12.330e+3 14.098e+3 11.772e+3 17.332e+3 13.237e+3 11.136e+3 12.481e+3
status
C1 DC50 108 mV/div 0.0 mV offset Δy -305 mV
C2 DC 144 mV/div 0.0 mV offset Δy -406 mV
C3 DC50 95 mV/div -10.0 mV ofst Δy -267.9 mV
F1 FFT(C1) 20.0 dB/div 200 MHz/div Δy -56.4 dB
Timebase 4.00 ns 2.00 ns/div 200 S 10 GS/s
Trigger C1 Auto -2 mV Edge Positive
LeCroy
2/27/2006 5:00:36 PM



8. Summary



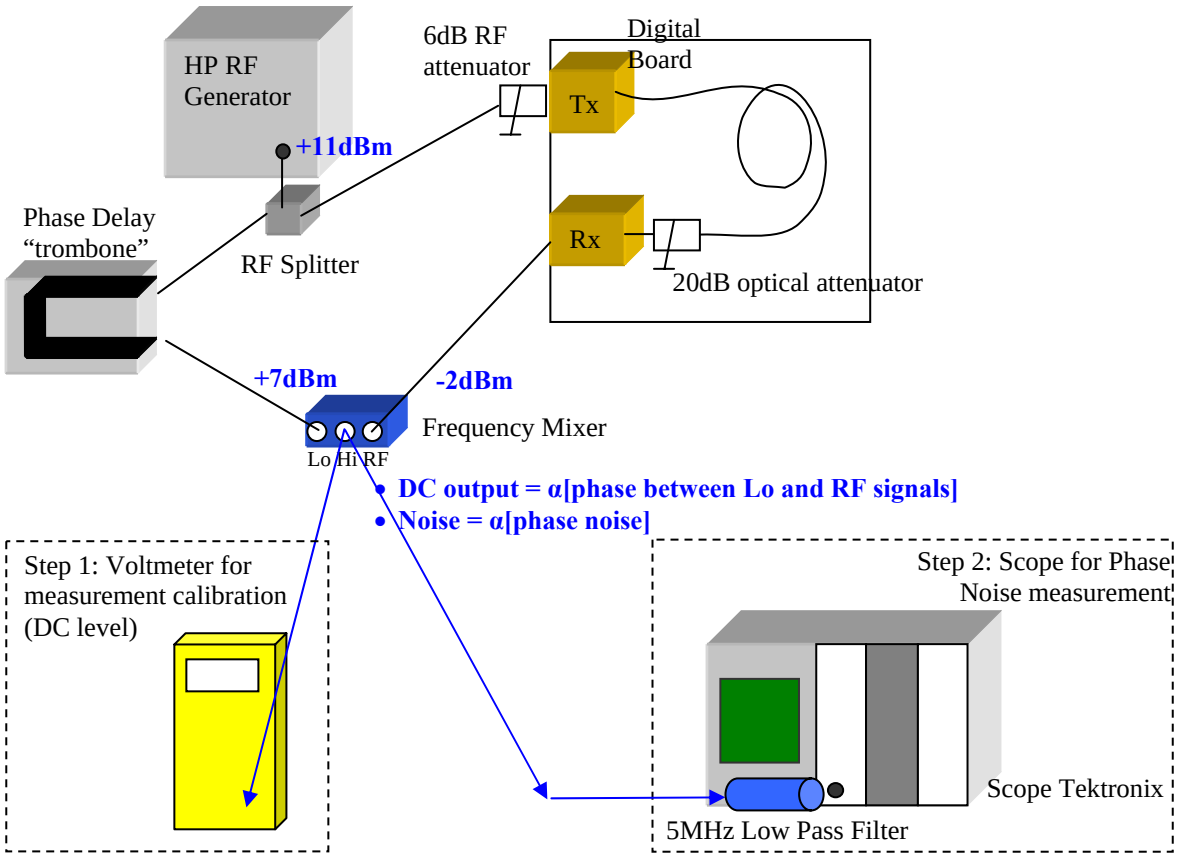
	skew(C1,C2)	skew(C1,C3)	skew(C3,C2)
10	86	89	18
40	43	49	34
100	19	24	16
200	10	17	16
300	9	15	15
360	7	14	14
400	7	21	20



	dper@lv(C1)	dper@lv(C2)	dper@lv(C3)
10	203	110	116
40	98	53	61
100	44	18	38
200	19	15	37
300	14	15	33
360	11	13	28
400	11	11	33

II. PHASE NOISE MEASUREMENT USING AN ANALOG SCOPE

A. *Setup*



- RF generator type 8662A
- Oscilloscope Tektronix type 7613 with modules 7B92A for triggering and 7A22 for very high vertical resolution (10uV/division)
- RF splitter, attenuators and LPF (type SLP-5) from mini-circuits
- Frequency mixer type ZLW-1W

B. Results

First remarks:

- Contrary to the measurements done with the MITEQ link, we did not see a huge 50Hz noise. The measured phase noise is thus the real phase noise induced by the digital optical link.
- As the oscilloscope input has only 1MHz bandwidth, the phase noise measurement is limited to the DC-1MHz band.

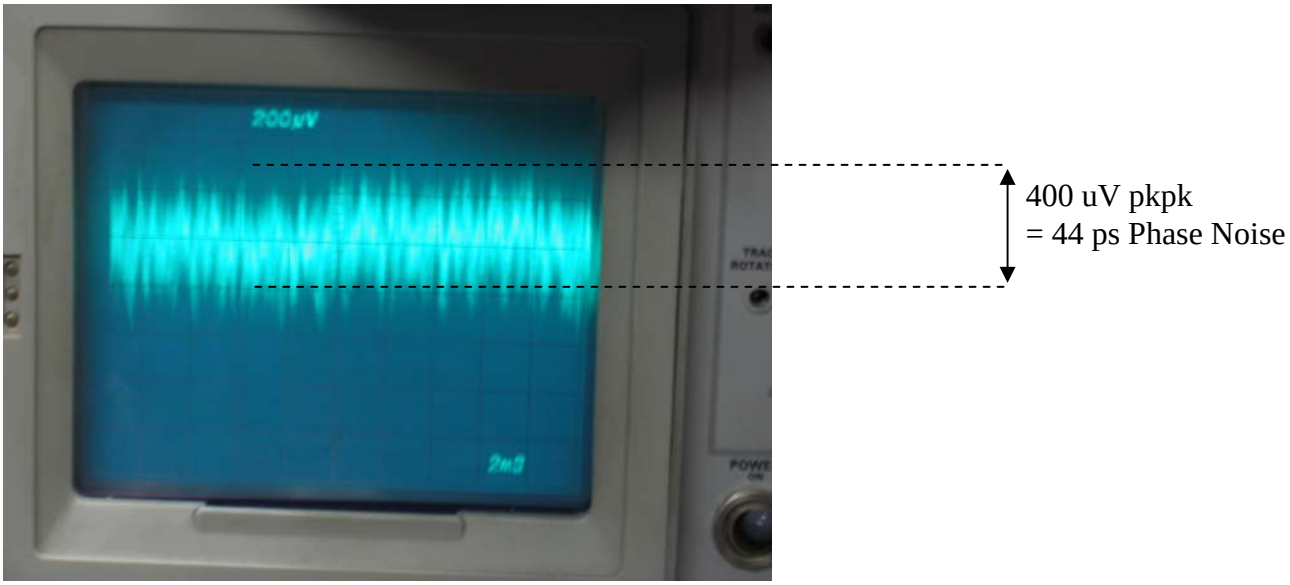
1. 10MHz

Calibration of the measurement, using the Voltmeter:

10 cm	3mV swing

Which gives us, using the relation 1cm = 33ps in vacuum,

110ps	1mV



Results:

Total Phase Noise = 44 ps pkpk

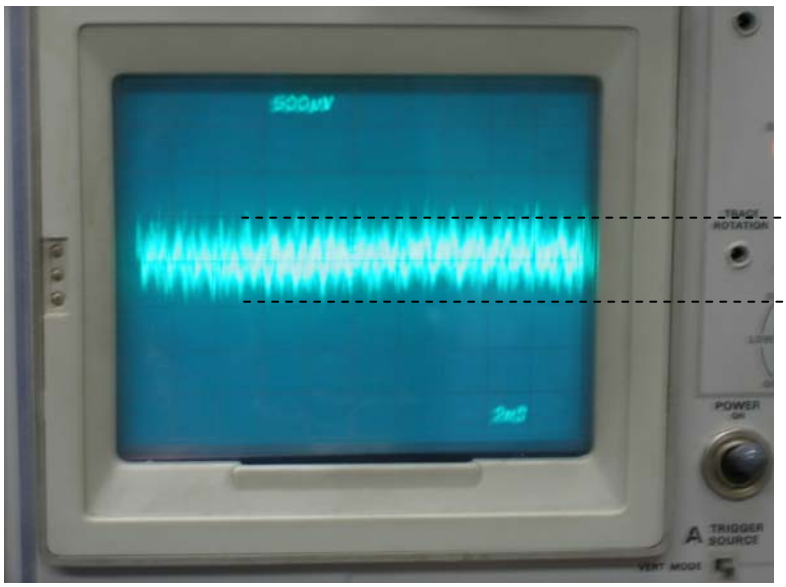
2. 40MHz

Calibration of the measurement, using the Voltmeter:

5 cm	5mV swing

Which gives us, using the relation 1cm = 33ps in vacuum,

33 ps	1mV



- 1mV pkpk
= 33 ps Phase Noise
- 140uV rms
=5ps rms

Results:

Total Phase Noise = 33 ps pkpk or 5ps rms

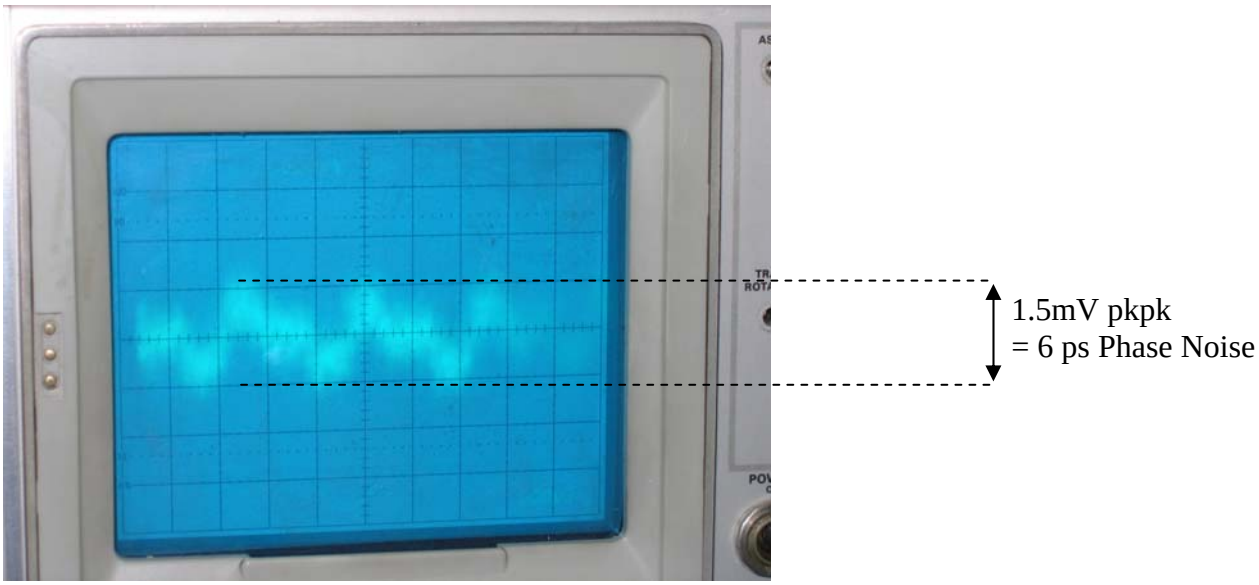
3. 160MHz

Calibration of the measurement, using the Voltmeter:

5 cm	40mV swing

Which gives us, using the relation 1cm = 33ps in vacuum,

4 ps	1mV



Results:

Total Phase Noise = 6 ps pkpk

4. Summary

Phase Noise

Frequency	Phase Noise (ps pkpk) in the DC-1MHz band
10 MHz	44 ps
40 MHz	33 ps
160 MHz	6 ps

Phase Noise Vs Jitter

Frequency	Phase Noise in the DC-1MHz band, Analog measurement setup	Skew jitter (rms), Digital measurement setup
10	44 ps pkpk	89 ps rms
40	33 ps pkpk	49 ps rms
100		24 ps rms
160	6 ps pkpk	
200		17 ps rms
300		15 ps rms
360		14 ps rms
400		21 ps rms