



## Ribbon Micro-Coax Cable Assembly, .025" centers Project 1302

Test 257  
JFS 12/10/02

### Summary of Results

These results show that the cable assemblies perform well at 622Mb/s data rates. The eye pattern shows minimal closure. The crosstalk is consistent with connectors on these small pitch lengths.

The results include the effects of the mating connectors and test boards (see Test Setup)

	Single ended	Differential
Risetime degradation	431 psec	267 psec
Impedance mismatch at 500psec risetime	64 ohms max	84 ohms min
Attenuation at 300MHz	-1.5dB	-1.6 dB
Eye diagram opening at 622Mb/s	91% of input	85% of input
FEXT at 500psec risetime (one aggressor)	8.2%	2.3%
NEXT at 500psec risetime (one aggressor)	12%	not measured
Insulation resistance at 50 volts dc*	> 50Gohm	> 50Gohm

\*between adjacent signals and between signal and ground

### Test Equipment

Tektronix CSA-803/SD-24 TDR Signal Analyzer  
Hewlett Packard HP-8753C, 300 KHz to 6 GHz Network Analyzer  
Anritsu MP1701B 10Gb/s Pattern Generator  
Avtech AVP-AV, 6 channel, bipolar Pulse Generator  
Anzac differential baluns - 2MHz to 2GHz  
General Radio Megohmmeter 1863  
Meritec semi-rigid probes

### Test Setup

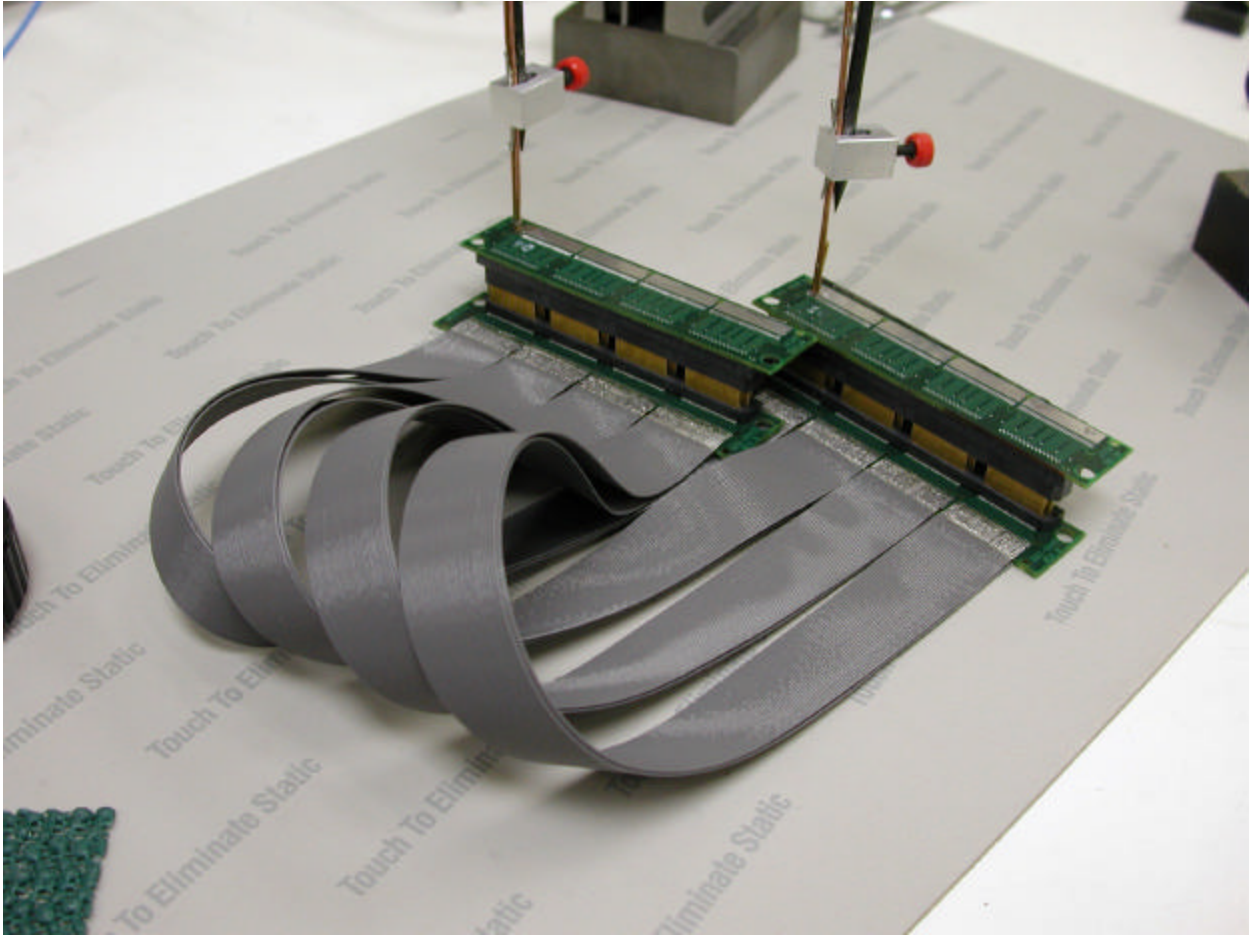
The measured signal path (DUT) includes short traces on printed circuit boards and connectors mated to the assembly under test:

Near end: solder pads on pcb #1302-00401  
Samtec QSH-120-01-L-D-A connector

Assembly under test: Samtec QTH-120-04-H-D-A connector  
pcb #1302-00401  
12" ribbon coax cable (50 ohm, .025" centers, 38awg)  
pcb #1302-00401  
Samtec QTH-120-04-H-D-A connector

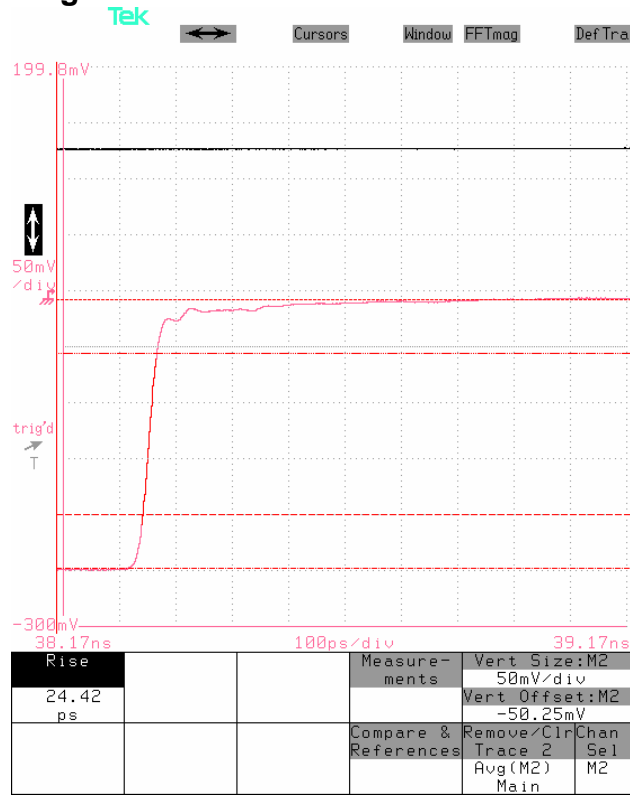
Far end: Samtec QSH-120-01-L-D-A connector  
solder pads on pcb #1302-00401

The term “fixture” throughout this report refers to measurements made through the interface cables and probes without the DUT inserted .

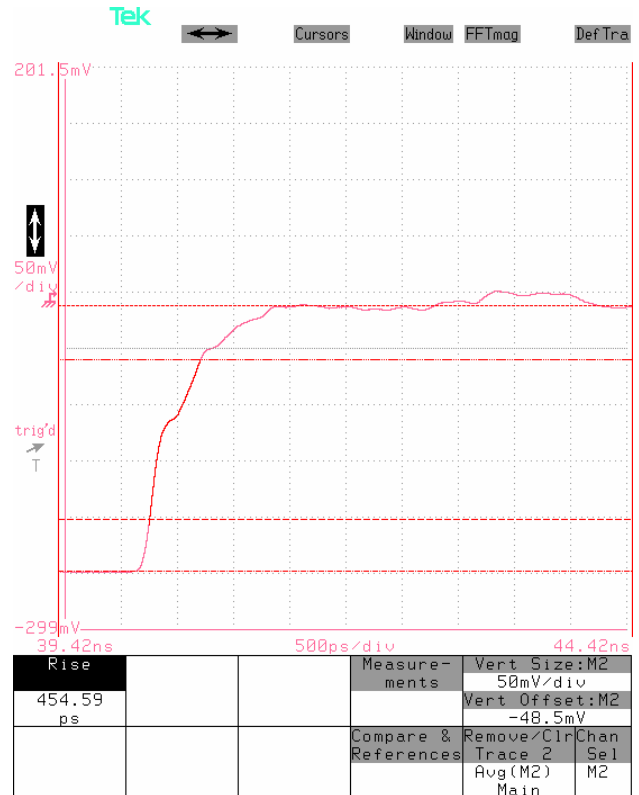


Test Setup

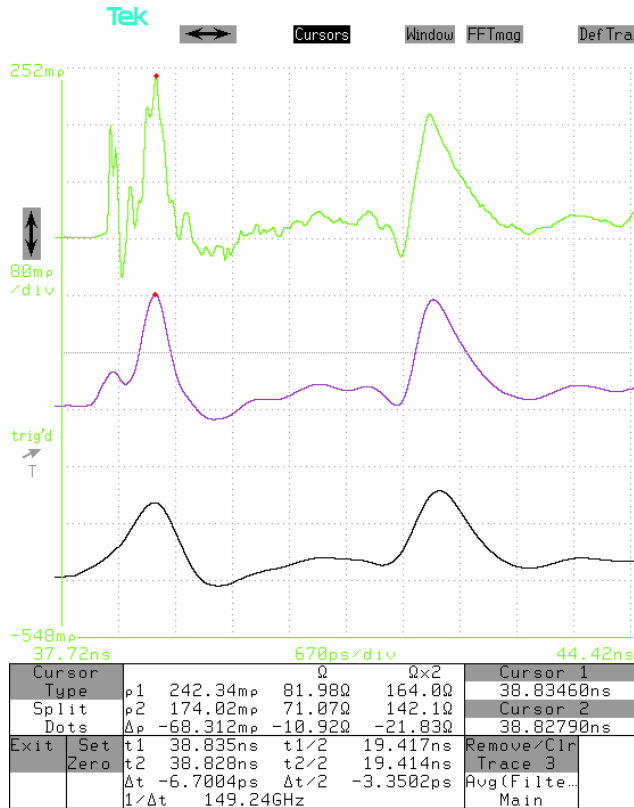
### Single-ended Measurements



Fixture risetime 24.4 psec



Risetime degradation at pin 4  
 $455\text{ps} - 24\text{ps} = 431\text{psec}$



**Impedance pin 4**

top to bottom traces:

Risetime = 35 – 250 – 500 psec

Peak impedance = 82 – 71 – 64 ohms

Left side is near end connector, right side is far end connector



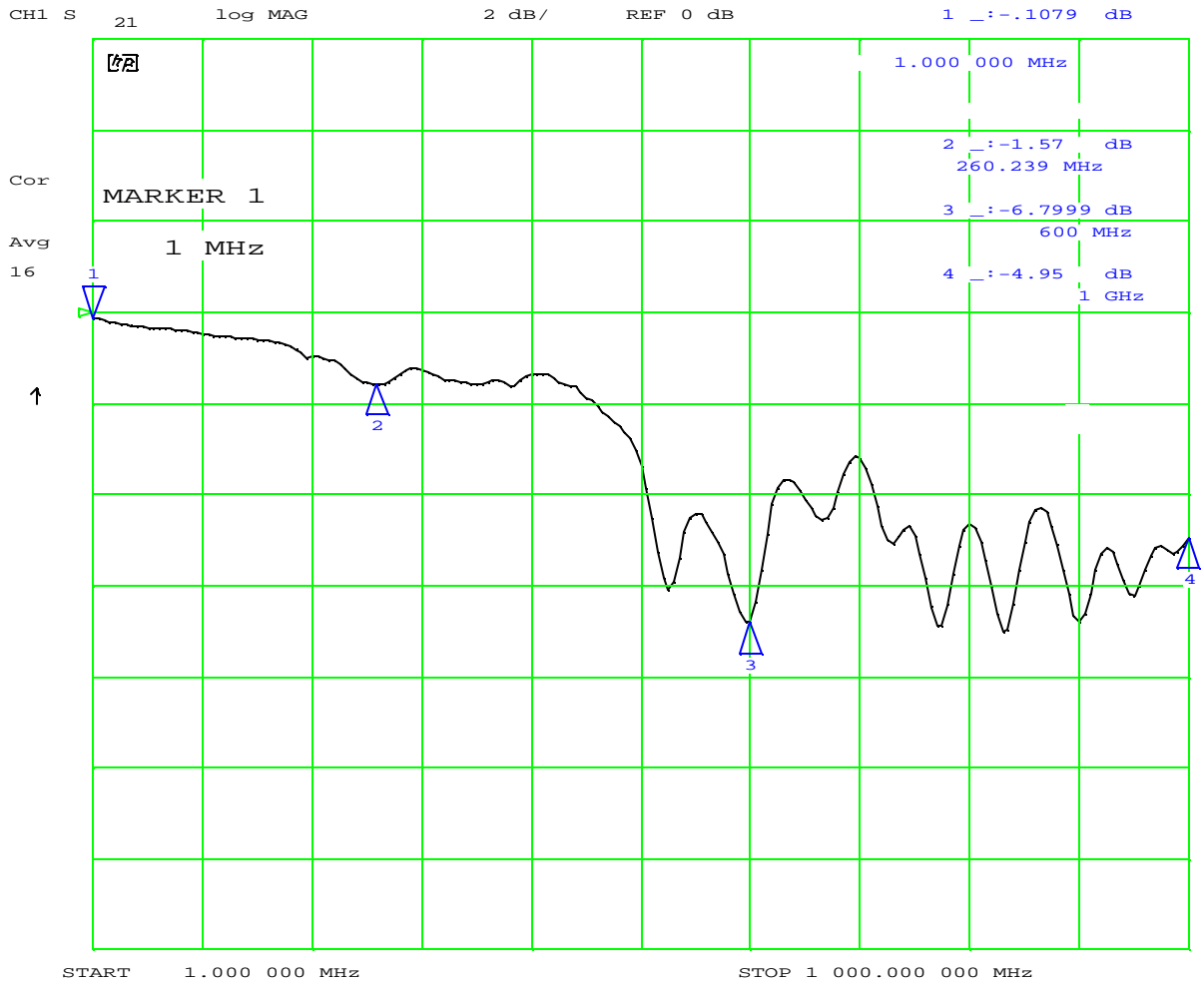
**Impedance pin 2**

top to bottom traces:

Risetime = 35 – 250 – 500 psec

Peak impedance = 75 – 70 – 65 ohms

Left side is near end connector, right side is far end connector



Attenuation (S21) - Pin 2 (fixture has been subtracted)

Horizontal Scale: 1 MHz to 1 GHz

Vertical Scale: 2dB/div

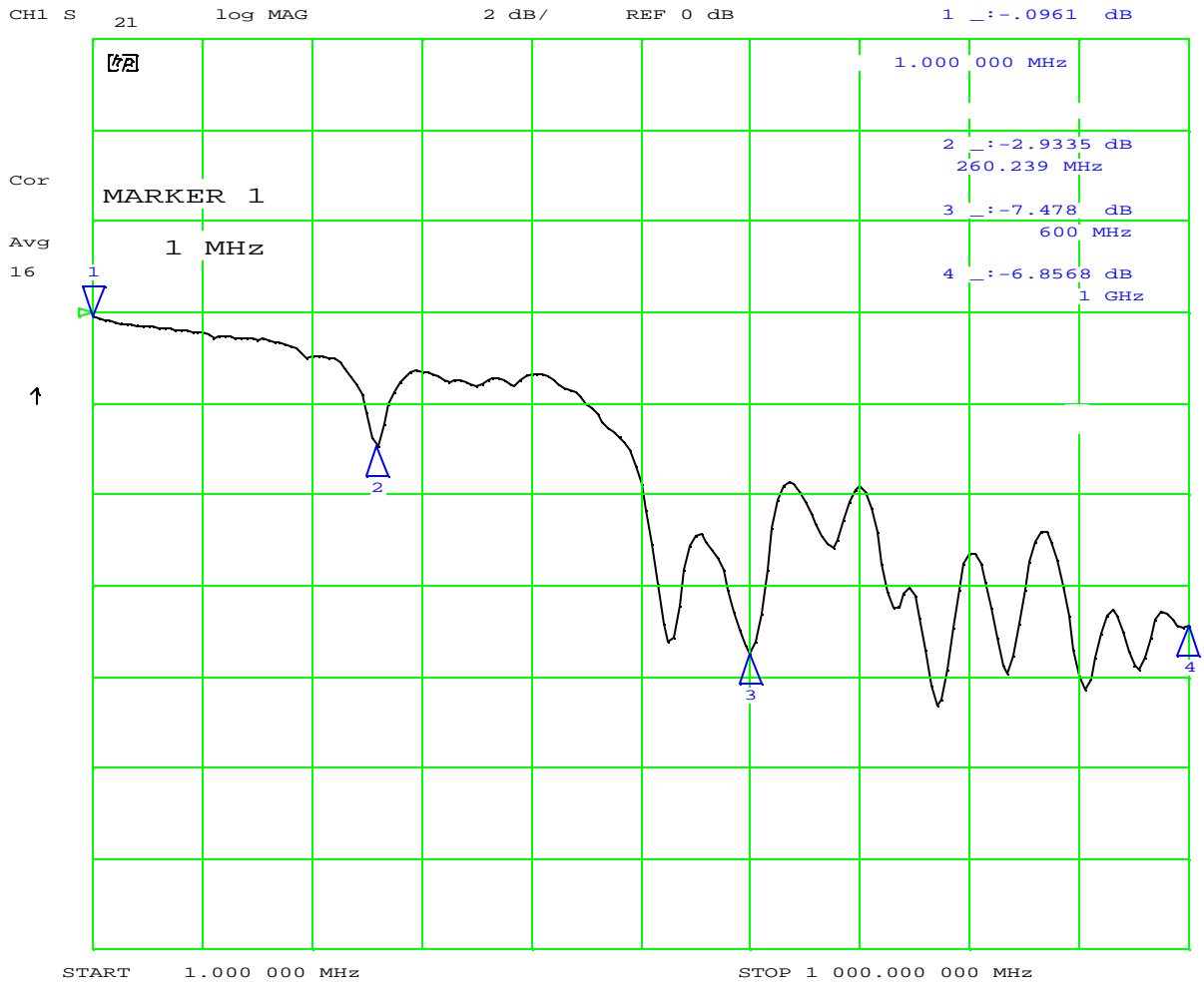
Markers:

1 at 1MHz = -0.10 dB

2 at 260MHz = -1.57 dB

3 at 600MHz = -6.80 dB

4 at 1GHz = -4.95 dB



Attenuation (S21) - Pin 4 (fixture has been subtracted)

Horizontal Scale: 1 Mhz to 1 GHz

Vertical Scale: 2dB/div

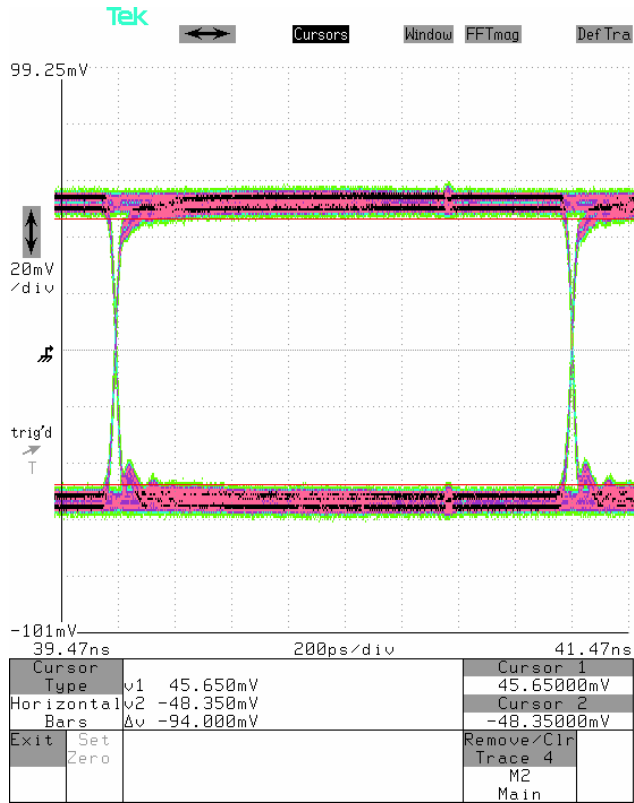
Markers:

1 at 1MHz = -0.10 dB

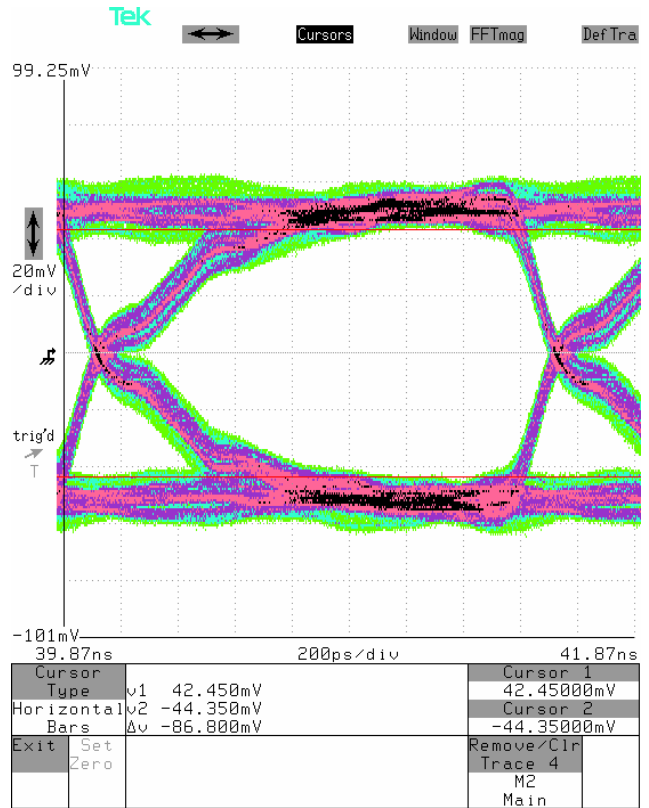
2 at 260MHz = -2.93 dB

3 at 600MHz = -7.48 dB

4 at 1GHz = -6.86 dB



Fixture at 622Mb/s 2<sup>7</sup>-1 PBRs  
 Stimulus = 100 mv peak to peak  
 Eye height = 94 mv



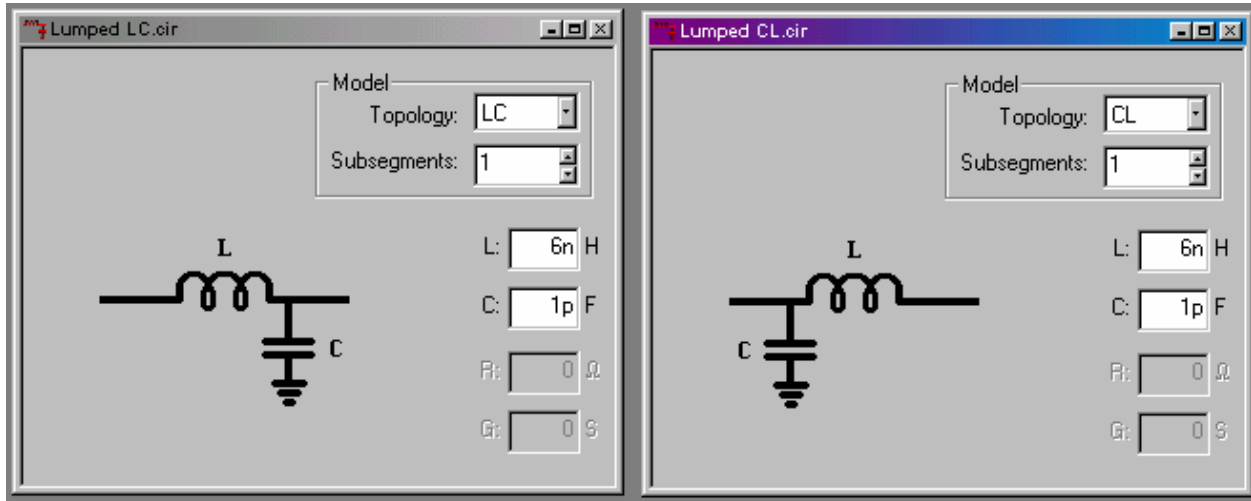
Pin 4 at 622Mb/s 2<sup>7</sup>-1 PBRs  
 Eye height = 86 mv

Crosstalk  
 Active pulse 500mv amplitude  
 Pin 4 quiet

	Active pins				
Risetime	2	6	1	3	5
FEXT					
360ps	-45mv	-48mv	-5.7mv	-6.2mv	-6.5mv
	9%	9.6%	1.1%	1.2%	1.3%
560ps	-40mv	-41mv	-5.0mv	-5.0mv	-5.6mv
	8%	8.2%	1%	1%	1.1%
NEXT					
360ps	78mv	78mv	5.2mv	6.0mv	5.3mv
	15.6%	15.6%	1.0%	1.2%	1.1%
560ps	60mv	61mv	4.3mv	5.0mv	4.5mv
	12%	12%	.9%	1%	0.9%

### Single-ended SPICE Model

(For risetimes of 500 psec or longer)



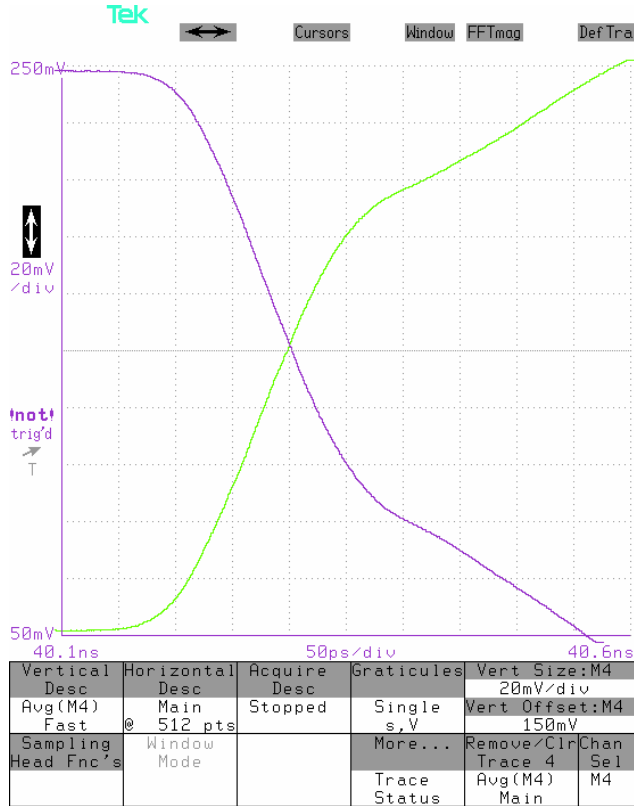
Near end connector

Far end connector

Near end connector	Cable	Far end connector
LC	T-line	CL
L = 6 nH	Zo = 51.6 ohms	C = 1 pF
C = 1 pF	Td = 1.5 nsec	L = 1 nH







Skew - pins 6 and 8 = approx. 4 psec



Impedance - pins 6 and 8

top to bottom traces:

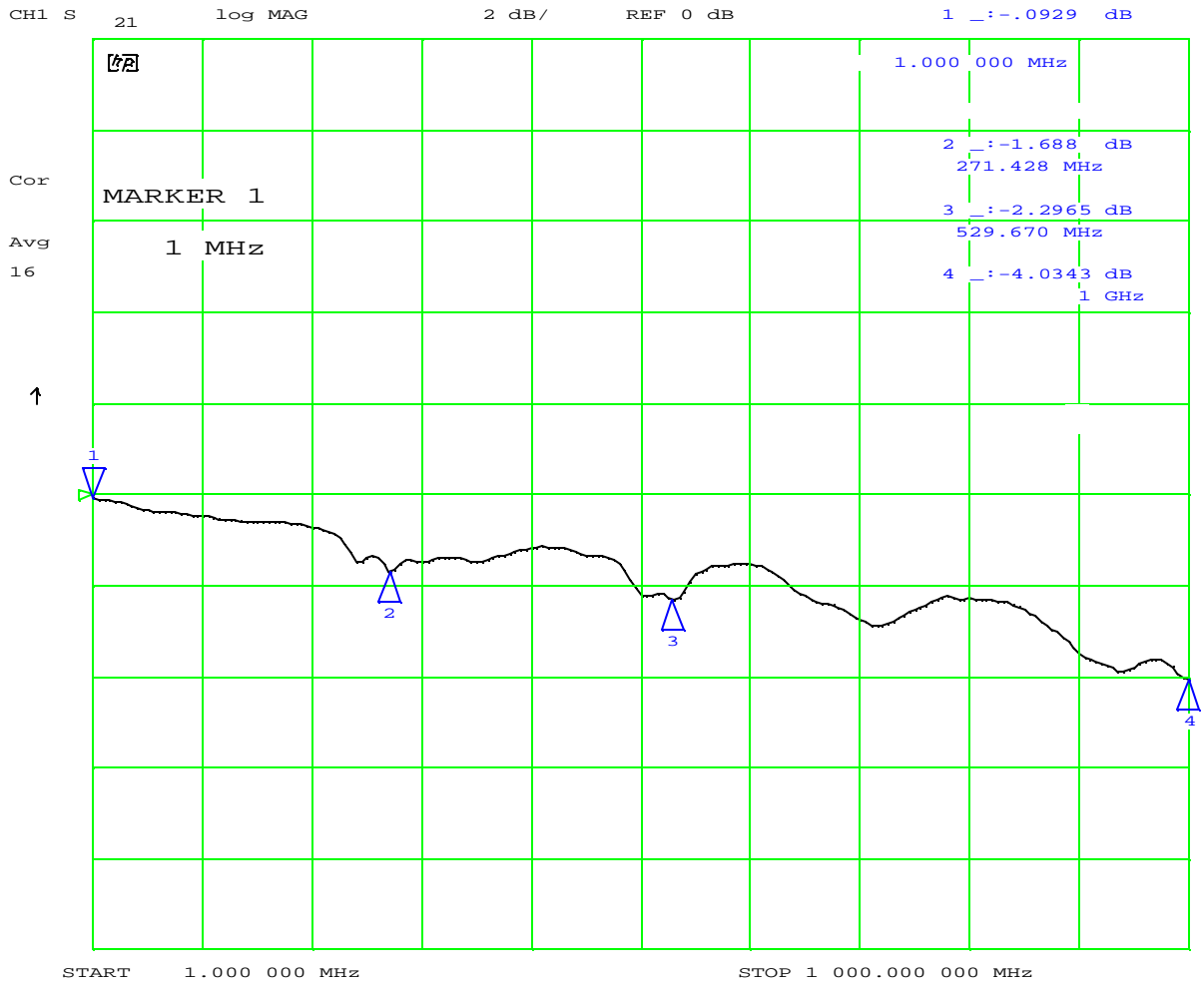
Risetime = 35 – 250 – 500 psec

Minimum impedance =

52 – 73 – 84 ohms

Left side is near end connector, right

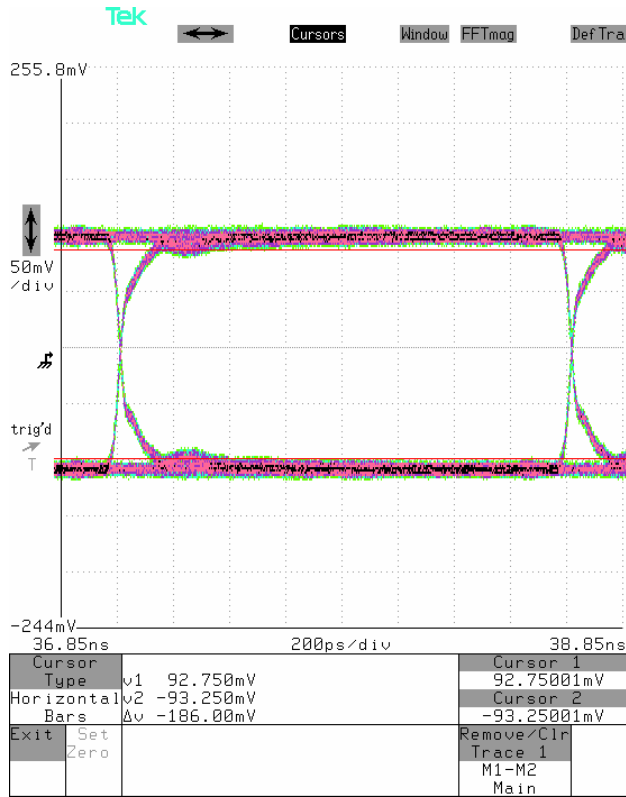
side is far end connector



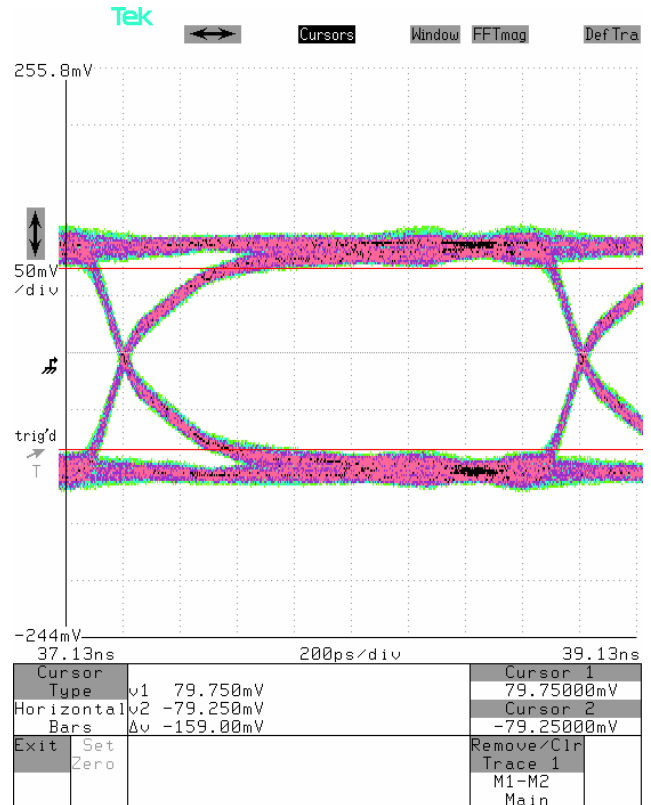
S21 Pins 6 and 8 (fixture has been subtracted)

Attenuation (S21) - Pin 6 and 8  
Horizontal Scale: 1 MHz to 1 GHz  
Vertical Scale: 2dB/div  
Markers:

- 1 at 1MHz = -0.09 dB
- 2 at 271MHz = -1.69 dB
- 3 at 530MHz = -2.30 dB
- 4 at 1GHz = -4.03 dB



Fixture at 622Mb/s 2<sup>7</sup>-1 PBRs  
 Stimulus = 200 mv peak-peak  
 Eye height = 186 mv



Pins 6 and 8 at 622Mb/s 2<sup>7</sup>-1 PBRs  
 Eye height = 159 mv

### Crosstalk

(Due to difficulty of probing the DUT differentially, only FEXT was measured and it was measured using the TDR pulse)

Active pulse on pins 2 and 4: amplitude 500mv , risetime 24psec  
 Pins 6 and 8 quiet

FEXT: -22mv or 4.4% at risetime of 24 psec  
 -11.7mv or 2.3% at risetime of 500 psec using software filter

**Appendix -Short Assembly with shorter cable and short connectors  
Single ended**

Signal path:

Near end: solder pads on pcb #1302-00401  
Samtec QSH-120-01-L-D-A connector

Assembly under test: Samtec QTH-120-03-H-D-A connector  
pcb #1302-00401  
6" ribbon coax cable (50 ohm, .025" centers, 38awg)  
pcb #1302-00401  
Samtec QTH-120-03-H-D-A connector

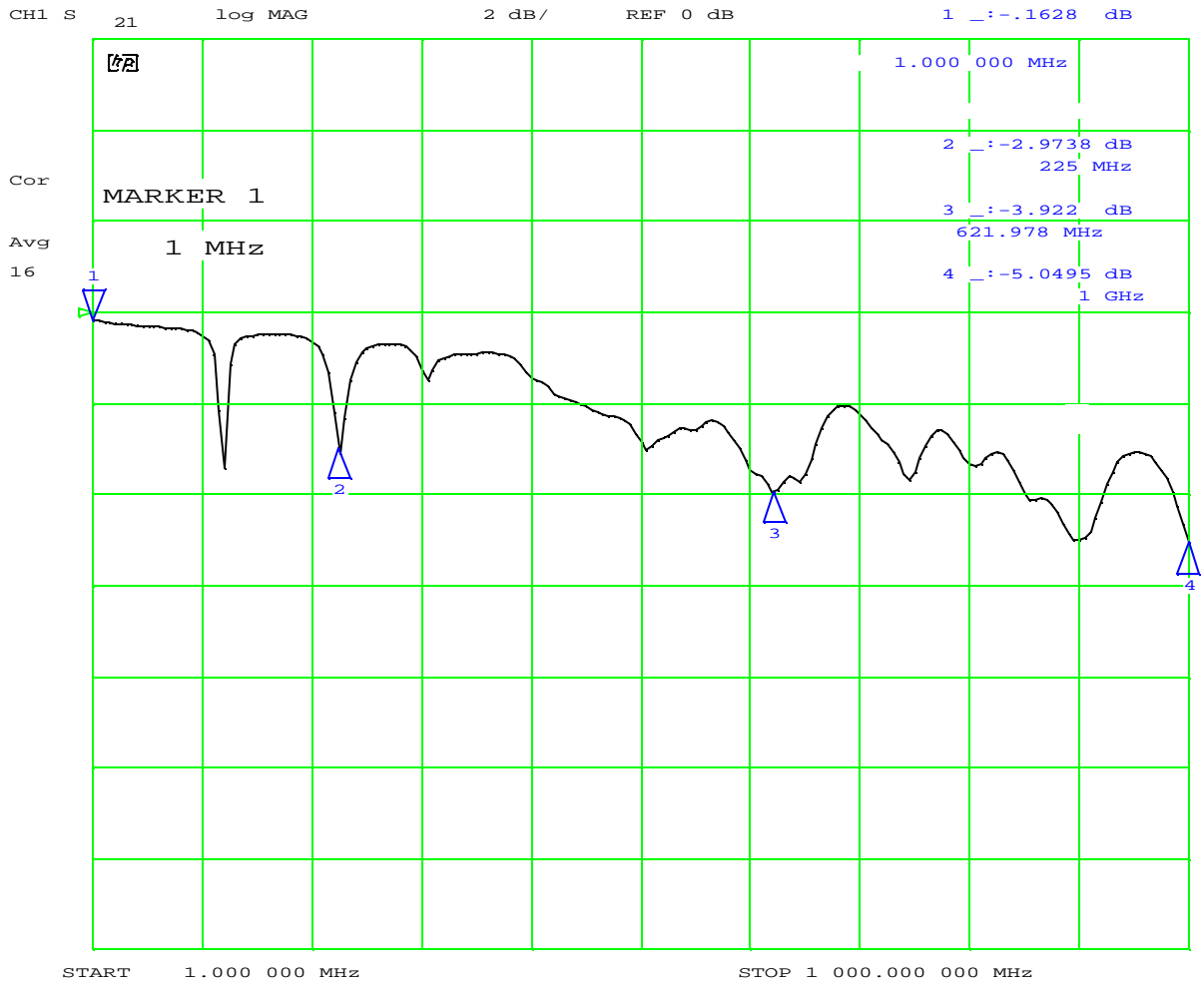
Far end: Samtec QSH-120-01-L-D-A connector  
solder pads on pcb #1302-00401

Crosstalk, single ended

Active pulse 500mv amplitude

Pin 4 quiet

	Short Assy.	Long Assy.
Risetime	2	2
FEXT		
360ps	-44mv	-45mv
	8.8%	9%
560ps	-36mv	-40mv
	7.2%	8%
NEXT		
360ps	59mv	78mv
	11.8%	15.6%
560ps	45mv	60mv
	9%	12%



Attenuation (S21) - Pin 62 (fixture has been subtracted)

Horizontal Scale: 1 Mhz to 1 GHz

Vertical Scale: 2dB/div

Markers:

1 at 1MHz = -0.16 dB

2 at 260MHz = -2.97 dB

3 at 600MHz = -3.92 dB

4 at 1GHz = -5.04 dB