



3933 US Route 11
Cortland, NY 13045

Telephone: (607) 753-6711
Facsimile: (607) 758-3659
www.intertek.com

May 20, 2014

Test report number 101593267CRT-002a
Project number 101593267-311

Berk-Tek LLC
132 White Oak Road
New Holland, PA 17557

TEST:

Final qualification testing of a 100 Ω, 4 Pair telecommunication cable electrical performance to the requirements of ANSI/TIA-568-C.2 and the client's custom enhanced specification for Category 6A cable.

STANDARDS USED:

ANSI/TIA-568-C.2-2009: Balanced Twisted-Pair Telecommunications Cabling and Components Standards, dated August 2009

LANmark-XTP, CAT6A, CMP, UTP, XXRL Custom Specification, Revision 2, Dated April 1, 2014

SECTIONS:

Section 6.4: Horizontal cable transmission performance (6.4.1 to 6.4.27) of ANSI/TIA-568-C.2

Section 3: Electrical Details of LANmark-XTP Specification

AUTHORIZATION:

The project was authorized by Mr. Darren Scott, representing the client, Berk-Tek LLC, with signed quotation number 500518686.

SAMPLE DESCRIPTION:

An Intertek representative randomly selected 700 meters of a Category 6A, 4-Pair, 23 AWG, XTP, Plenum, Horizontal (solid) cable, identified as part number LANmark XTP CMP. The cables were bundled in a 6 around 1 configuration. The sample was received on May 2, 2014 and was in good condition.

EQUIPMENT LIST:

The following equipment was employed in conducting the tests.

<u>Equipment used</u>	<u>Model number</u>	<u>Control number</u>	<u>Calibration date</u>	<u>Calibration due date</u>
HP Automatic Cable Test System	46152A	E307	2/26/2014	2/26/2015

DATE OF TEST:

May 15, 2014



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TEST REPORT REVISION HISTORY:

First Issue: May 20, 2014 Original Document

RESULTS: See appendix A for the test results.

CONCLUSION:

The 100 Ω , 4-Pair telecommunication cable, as previously described and randomly selected by an Intertek representative, was tested in accordance with the standards referred to on page 1, and did comply with the indicated applicable transmission requirements. The testing was performed at Intertek located in Cortland, New York.

The procedures and requirements were taken from the standard referred to on page 1.

Reviewed and Approved By:

Antoine Pelletier
Engineer
Global Cabling Products Testing

John Cash
Associate Engineer
Global Cabling Products Testing



Berk-Tek LLC

Test report number 101593267CRT-002a
May 20, 2014

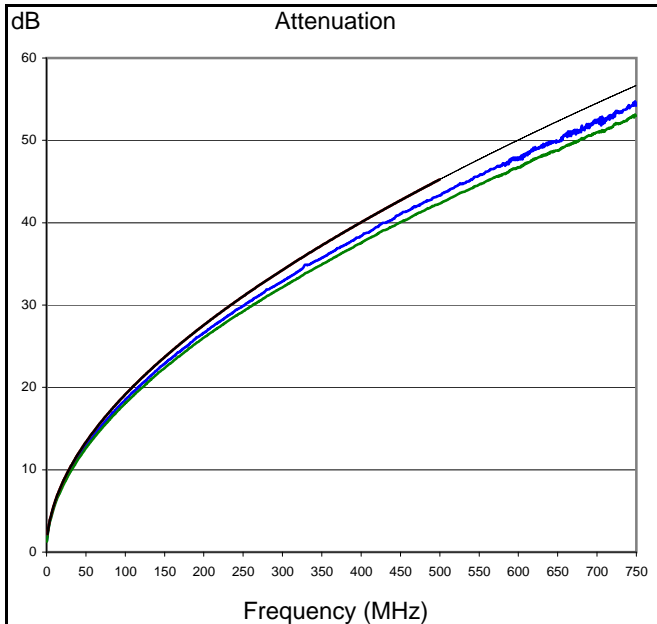
Appendix A
Test results

This appendix contains 7 pages.

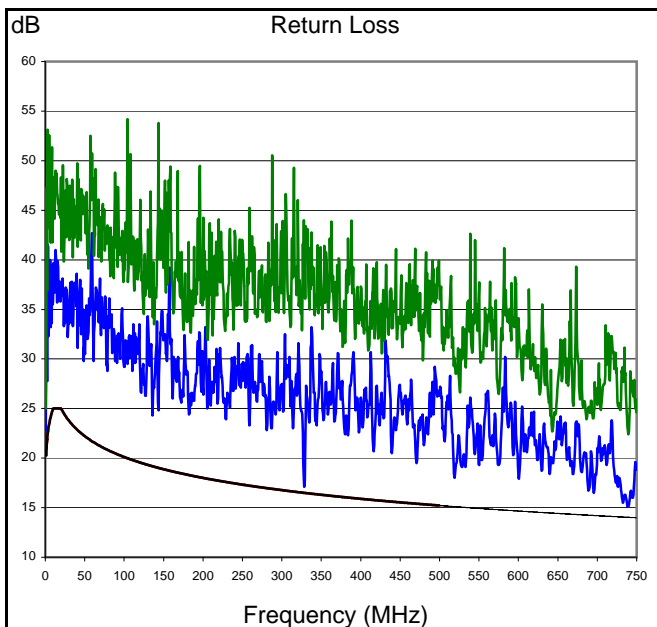
Summary

Client Berk-Tek LLC
Specifications Berk-Tek LANmark-XTP
 ANSI/TIA-568-C.2, Category 6A
Part Number LANmark XTP CMP
Description **Berk-Tek LANmark-XTP CMP**
 4X23 UTP-CMP-Solid

Test Started 5/15/2014 10:26
Technician John Cash
Report No. 101593267CRT-002a
Length (m) 100
Temperature 20 °C
Test Status **PASS**



Attenuation				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	2.0	1.9	2.1	2.1
4	3.8	3.6	3.8	3.8
8	5.1	5.0	5.3	5.3
10	5.7	5.5	5.9	5.9
16	7.2	7.0	7.5	7.5
20	8.0	7.8	8.4	8.4
25	9.0	8.8	9.4	9.4
31.25	9.5	9.2	10.5	10.5
62.5	14.5	14.2	15.0	15.0
100	18.5	18.1	19.1	19.1
250	29.9	29.2	31.1	31.1
500	43.3	42.3	45.3	45.3
600	47.8	46.8		
750	54.2	53.0		
Limit Margin (dB) :			0.15	0.15
Frequency (MHz) :			2.37	2.37



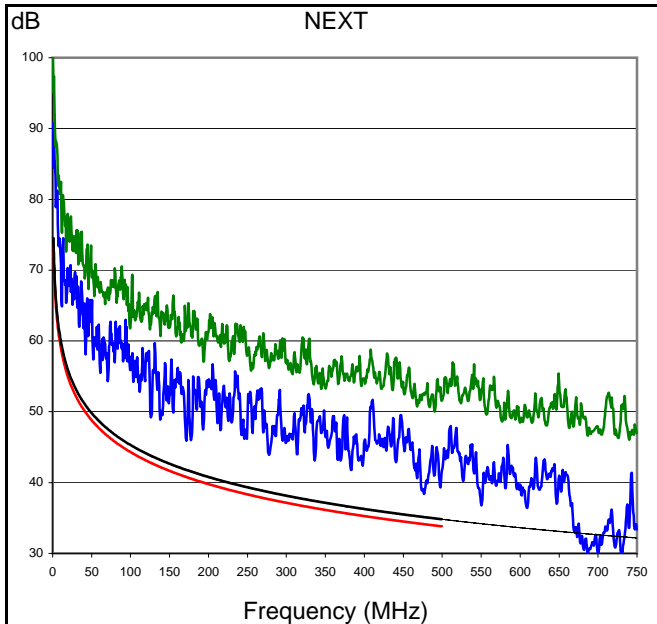
Return Loss				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	30.3	32.2	20.0	20.0
4	32.3	43.2	23.0	23.0
8	33.6	49.2	24.5	24.5
10	35.8	46.8	25.0	25.0
16	39.3	45.7	25.0	25.0
20	37.5	48.3	25.0	25.0
25	33.6	46.1	24.3	24.3
31.25	37.0	48.2	23.6	23.6
62.5	33.5	43.1	21.5	21.5
100	29.2	38.8	20.1	20.1
250	29.3	42.0	17.3	17.3
500	26.3	38.2	15.2	15.2
600	18.0	34.1		
750	18.8	24.6		
Limit Margin (dB) :			0.61	0.61
Frequency (MHz) :			328.46	328.46

Legend : Blue - Worst Case; Green - Average; Red - TIA Specification; Black - LANmark Specification

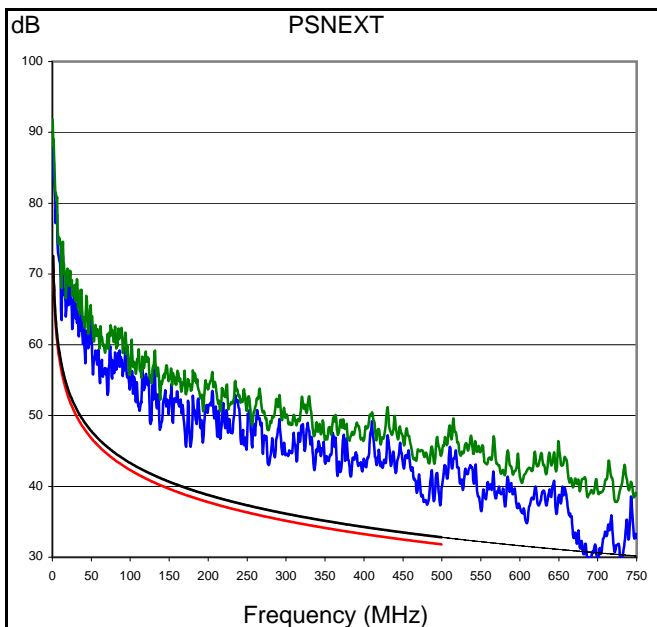
Summary

Client Berk-Tek LLC
Specifications Berk-Tek LANmark-XTP
 ANSI/TIA-568-C.2, Category 6A
Part Number LANmark XTP CMP
Description **Berk-Tek LANmark-XTP CMP**
 4X23 UTP-CMP-Solid

Test Started 5/15/2014 10:26
Technician John Cash
Report No. 101593267CRT-002a
Length (m) 100
Temperature 20 °C
Test Status **PASS**



NEXT				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	84.5	95.0	75.3	74.3
4	78.9	88.2	66.3	65.3
8	73.4	83.4	61.8	60.8
10	72.6	81.0	60.3	59.3
16	67.9	76.2	57.2	56.2
20	68.5	76.7	55.8	54.8
25	68.2	74.6	54.3	53.3
31.25	65.9	74.8	52.9	51.9
62.5	59.1	67.4	48.4	47.4
100	55.9	62.2	45.3	44.3
250	47.3	57.9	39.3	38.3
500	41.6	51.6	34.8	33.8
600	39.7	48.5		
750	33.4	47.0		
Limit Margin (dB) :			3.27	4.27
Frequency (MHz) :			476.51	476.51



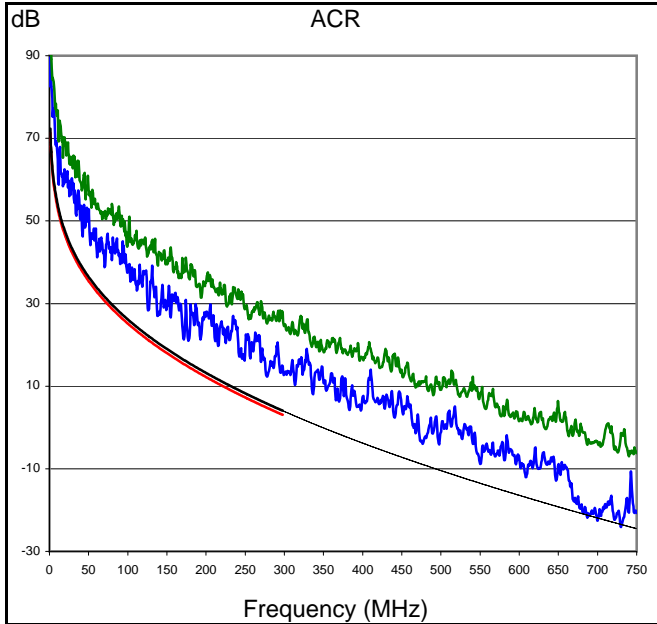
PSNEXT				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	83.4	88.1	73.3	72.3
4	77.2	81.6	64.3	63.3
8	72.7	74.3	59.8	58.8
10	71.7	74.7	58.3	57.3
16	66.9	70.3	55.2	54.2
20	66.5	69.6	53.8	52.8
25	64.6	69.1	52.3	51.3
31.25	64.4	67.6	50.9	49.9
62.5	56.6	61.6	46.4	45.4
100	54.2	56.2	43.3	42.3
250	46.0	50.6	37.3	36.3
500	39.7	44.5	32.8	31.8
600	37.0	41.4		
750	32.7	38.8		
Limit Margin (dB) :			4.33	5.33
Frequency (MHz) :			480.88	480.88

Legend : Blue - Worst Case; Green - Average; Red - TIA Specification; Black - LANmark Specification

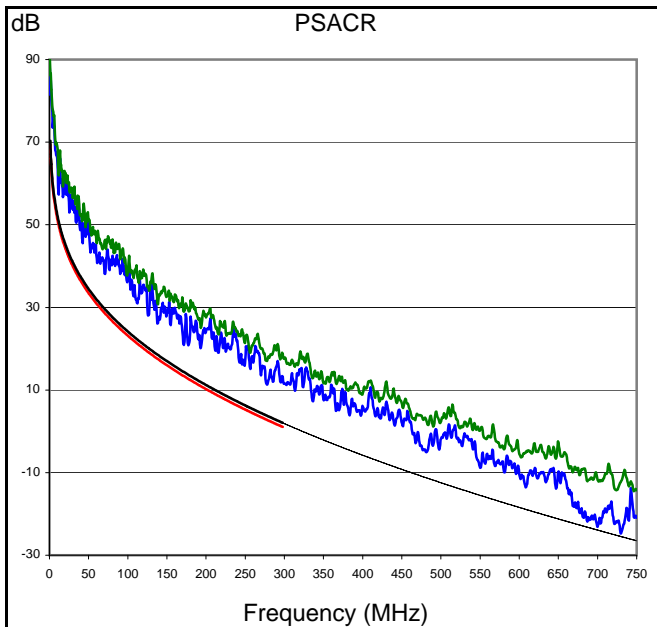
Summary

Client Berk-Tek LLC
Specifications Berk-Tek LANmark-XTP
 ANSI/TIA-568-C.2, Category 6A
Part Number LANmark XTP CMP
Description **Berk-Tek LANmark-XTP CMP**
 4X23 UTP-CMP-Solid

Test Started 5/15/2014 10:26
Technician John Cash
Report No. 101593267CRT-002a
Length (m) 100
Temperature 20 °C
Test Status **PASS**



ACR				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	82.6	93.3	73.2	72.2
4	75.2	84.7	62.5	61.5
8	68.3	78.4	56.4	55.4
10	67.0	75.5	54.4	53.4
16	60.7	69.2	49.8	48.8
20	60.6	68.8	47.4	46.4
25	59.1	65.8	45.0	44.0
31.25	56.4	65.5	42.4	41.4
62.5	44.6	53.2	33.4	32.4
100	37.5	44.1	26.2	25.2
250	17.3	28.6	8.3	7.3
500	-1.4	9.1		
600	-7.5	1.5		
750	-20.7	-6.2		
Limit Margin (dB) :		4.95	5.95	
Frequency (MHz) :		171.66	171.66	



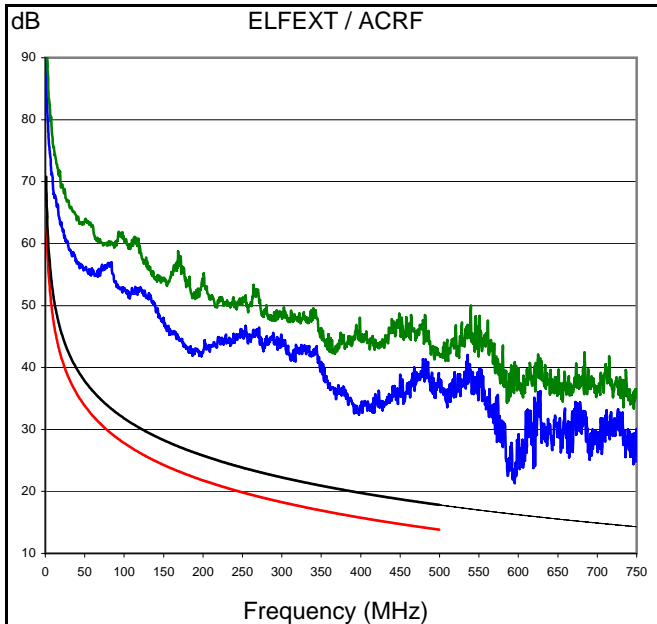
PSACR				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	81.5	86.2	71.2	70.2
4	73.5	77.9	60.5	59.5
8	67.6	69.3	54.4	53.4
10	66.2	69.2	52.4	51.4
16	59.8	63.3	47.8	46.8
20	58.6	61.8	45.4	44.4
25	55.5	60.3	43.0	42.0
31.25	55.2	58.3	40.4	39.4
62.5	42.1	47.4	31.4	30.4
100	36.6	38.1	24.2	23.2
250	16.4	21.4	6.3	5.3
500	-2.0	2.1		
600	-10.4	-5.4		
750	-20.9	-14.3		
Limit Margin (dB) :		6.46	7.46	
Frequency (MHz) :		11.74	11.74	

Legend : Blue - Worst Case; Green - Average; Red - TIA Specification; Black - LANmark Specification

Summary

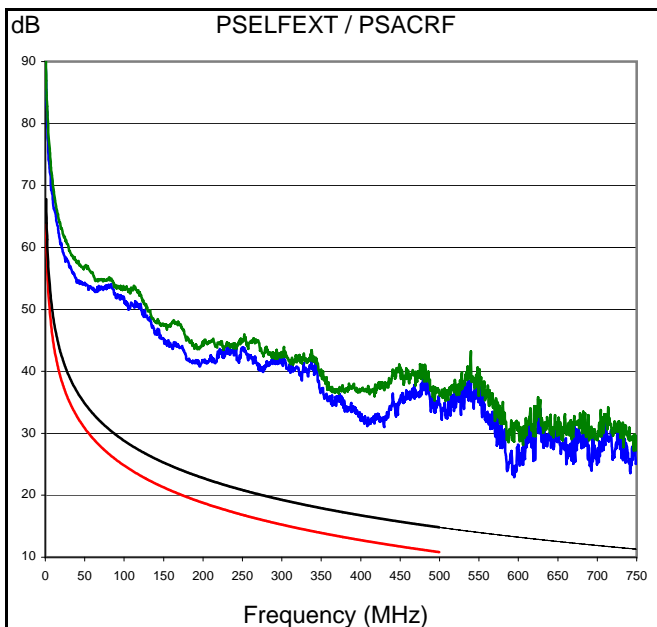
Client Berk-Tek LLC
Specifications Berk-Tek LANmark-XTP
 ANSI/TIA-568-C.2, Category 6A
Part Number LANmark XTP CMP
Description **Berk-Tek LANmark-XTP CMP**
 4X23 UTP-CMP-Solid

Test Started 5/15/2014 10:26
Technician John Cash
Report No. 101593267CRT-002a
Length (m) 100
Temperature 20 °C
Test Status **PASS**



ELFEXT / ACRF				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	87.2	93.8	71.8	67.8
4	77.5	84.0	59.8	55.8
8	71.1	78.3	53.7	49.7
10	69.3	75.9	51.8	47.8
16	66.1	72.0	47.7	43.7
20	63.0	69.2	45.8	41.8
25	61.3	68.7	43.8	39.8
31.25	60.5	66.8	41.9	37.9
62.5	54.8	61.2	35.9	31.9
100	52.7	60.6	31.8	27.8
250	45.5	50.2	23.8	19.8
500	37.1	42.3	17.8	13.8
600	29.2	39.9		
750	30.1	36.5		

Limit Margin (dB) : 12.59 16.59
 Frequency (MHz) : 397.80 397.80



PSELFEXT / PSACRF				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	85.5	86.9	68.8	64.8
4	74.4	78.0	56.8	52.8
8	69.3	71.8	50.7	46.7
10	67.2	69.9	48.8	44.8
16	63.4	65.4	44.7	40.7
20	60.4	63.1	42.8	38.8
25	58.5	61.8	40.8	36.8
31.25	58.1	60.6	38.9	34.9
62.5	53.2	55.1	32.9	28.9
100	51.9	53.2	28.8	24.8
250	43.6	44.7	20.8	16.8
500	34.7	36.7	14.8	10.8
600	28.1	31.7		
750	25.1	29.6		

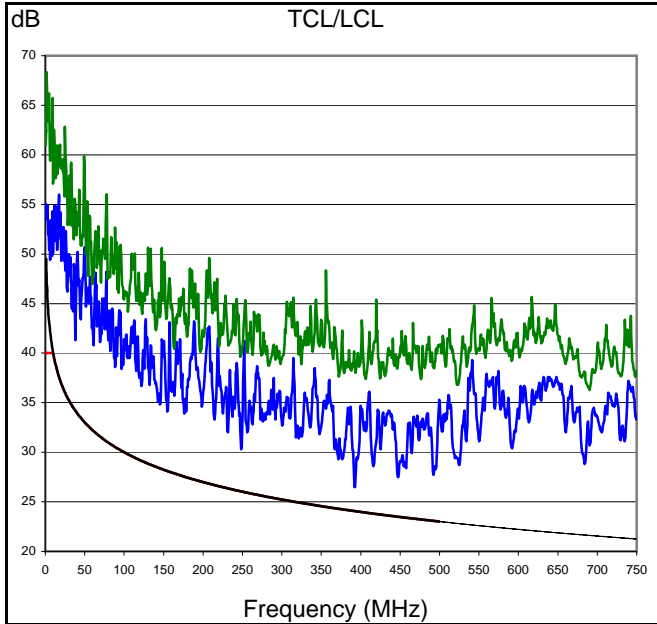
Limit Margin (dB) : 14.62 18.62
 Frequency (MHz) : 408.42 408.42

Legend : Blue - Worst Case; Green - Average; Red - TIA Specification; Black - LANmark Specification

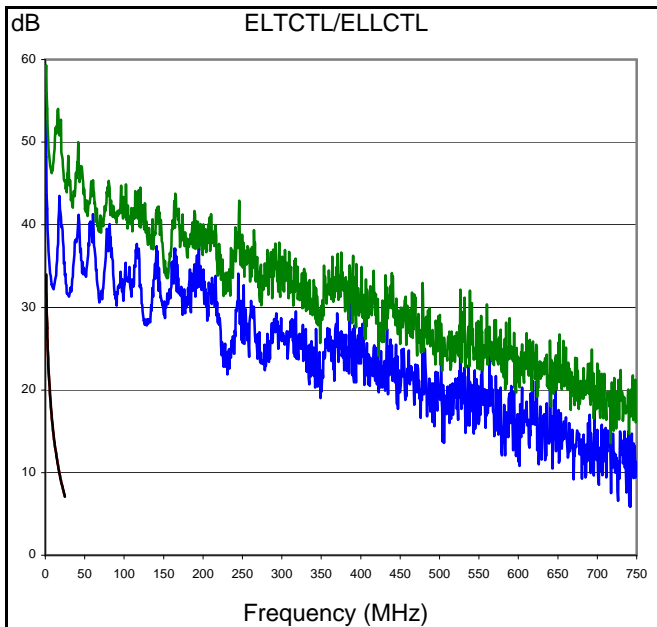
Summary

Client Berk-Tek LLC
Specifications Berk-Tek LANmark-XTP
 ANSI/TIA-568-C.2, Category 6A
Part Number LANmark XTP CMP
Description **Berk-Tek LANmark-XTP CMP**
 4X23 UTP-CMP-Solid

Test Started 5/15/2014 10:26
Technician John Cash
Report No. 101593267CRT-002a
Length (m) 100
Temperature 20 °C
Test Status **PASS**



TCL/LCL				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	55.0	62.4	50.0	40.0
4	52.6	66.0	44.0	40.0
8	51.0	60.7	41.0	40.0
10	50.1	57.1	40.0	40.0
16	51.5	58.7	38.0	38.0
20	51.0	58.7	37.0	37.0
25	49.4	62.8	36.0	36.0
31.25	46.6	57.3	35.1	35.1
62.5	45.2	50.8	32.0	32.0
100	41.4	45.4	30.0	30.0
250	32.0	40.7	26.0	26.0
500	35.3	40.7	23.0	23.0
600	33.7	40.4		
750	33.3	38.2		
Limit Margin (dB) :			2.43	2.43
Frequency (MHz) :			392.18	392.18



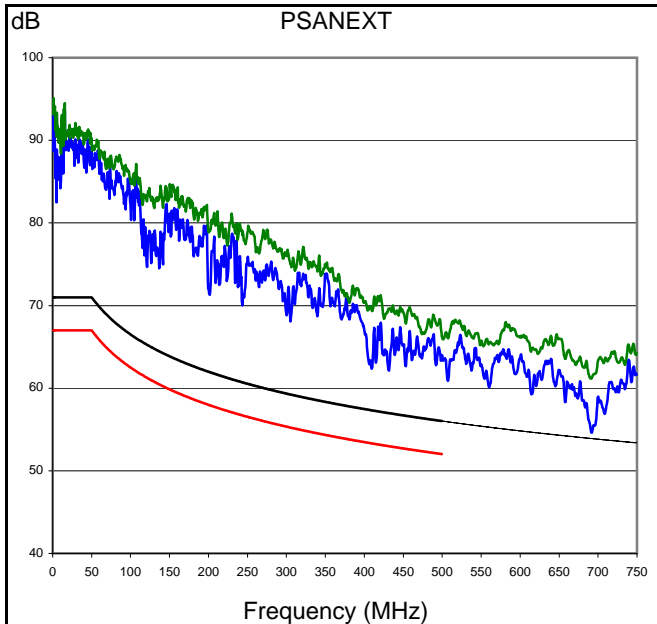
ELTCTL/ELLCTL				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	48.2	59.3	35.0	35.0
4	36.8	49.2	23.0	23.0
8	32.7	46.3	16.9	16.9
10	32.4	47.2	15.0	15.0
16	37.7	54.1	10.9	10.9
20	40.9	52.7	9.0	9.0
25	33.9	45.3	7.0	7.0
31.25	31.7	43.9		
62.5	37.1	42.5		
100	32.3	41.5		
250	30.7	38.8		
500	19.7	26.3		
600	11.3	22.8		
750	11.3	16.2		
Limit Margin (dB) :			13.46	13.46
Frequency (MHz) :			1.75	1.75

Legend : Blue - Worst Case; Green - Average; Red - TIA Specification; Black - LANmark Specification

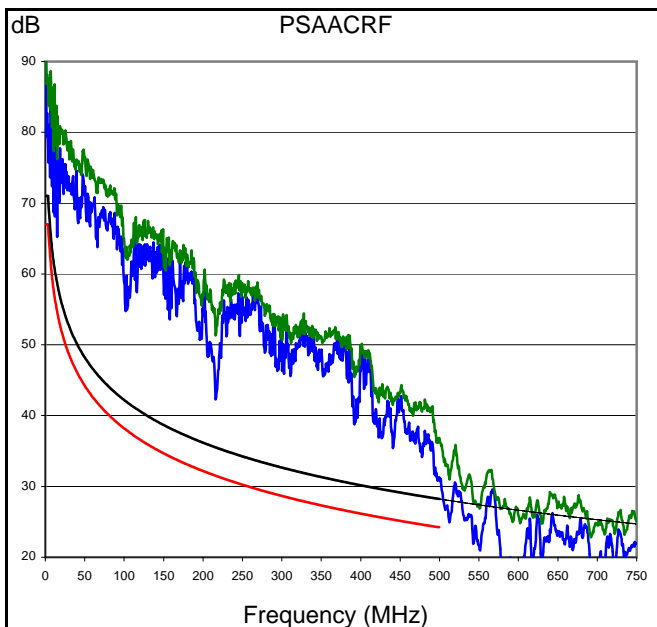
Summary

Client Berk-Tek LLC
Specifications Berk-Tek LANmark-XTP
 ANSI/TIA-568-C.2, Category 6A
Part Number LANmark XTP CMP
Description **Berk-Tek LANmark-XTP CMP**
 4X23 UTP-CMP-Solid

Test Started 5/15/2014 10:26
Technician John Cash
Report No. 101593267CRT-002a
Length (m) 100
Temperature 20 °C
Test Status **PASS**



PSANEXT				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	94.0	95.1	71.0	67.0
4	87.9	92.6	71.0	67.0
8	85.3	89.7	71.0	67.0
10	84.2	90.1	71.0	67.0
16	88.9	90.1	71.0	67.0
20	89.6	91.2	71.0	67.0
25	89.8	91.0	71.0	67.0
31.25	88.7	90.9	71.0	67.0
62.5	87.2	88.7	69.6	65.6
100	82.4	84.9	66.5	62.5
250	75.2	78.7	60.5	56.5
500	64.0	66.3	56.0	52.0
600	63.8	66.1		
750	61.6	64.2		
Limit Margin (dB) :			5.05	9.05
Frequency (MHz) :			409.67	409.67

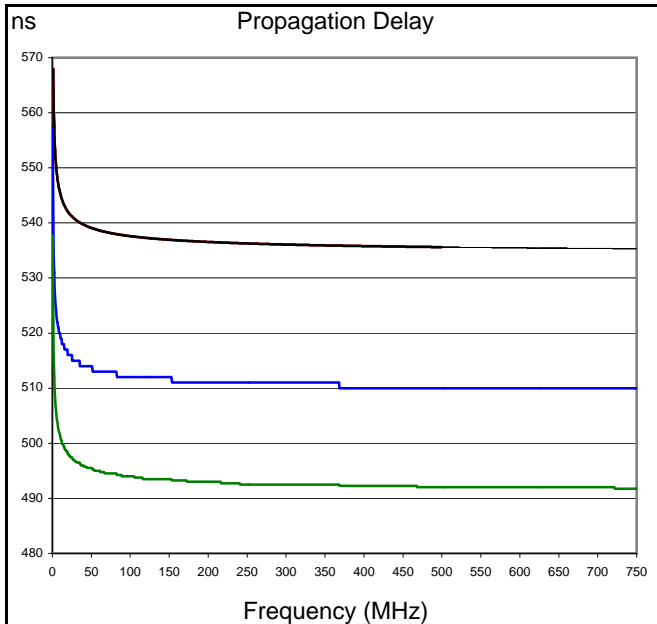


PSAACRF				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	86.0	90.1	71.0	67.0
4	75.7	83.8	70.2	66.2
8	76.2	82.6	64.1	60.1
10	75.7	82.7	62.2	58.2
16	71.4	78.4	58.1	54.1
20	74.4	80.3	56.2	52.2
25	72.1	78.5	54.2	50.2
31.25	74.4	78.3	52.3	48.3
62.5	70.9	73.3	46.3	42.3
100	59.0	65.0	42.2	38.2
250	56.8	58.7	34.2	30.2
500	31.3	36.9	28.2	24.2
600	18.1	25.8		
750	21.9	25.1		
Limit Margin (dB) :			2.54	6.54
Frequency (MHz) :			497.75	497.75

Legend : Blue - Worst Case; Green - Average; Red - TIA Specification; Black - LANmark Specification

Summary

Client	Berk-Tek LLC	Test Started	5/15/2014 10:26
Specifications	Berk-Tek LANmark-XTP ANSI/TIA-568-C.2, Category 6A	Technician	John Cash
Part Number	LANmark XTP CMP	Report No.	101593267CRT-002a
Description	Berk-Tek LANmark-XTP CMP 4X23 UTP-CMP-Solid	Length (m)	100
		Temperature	20 °C
		Test Status	PASS



Propagation Delay				
Freq. MHz	Worst Case	Average	LANmark Spec	TIA Spec
1	541.0	522.0	570.0	570.0
4	525.0	506.8	552.0	552.0
8	521.0	502.5	546.7	546.7
10	520.0	501.5	545.4	545.4
16	517.0	499.0	543.0	543.0
20	516.0	498.0	542.0	542.0
25	516.0	497.5	541.2	541.2
31.25	515.0	497.0	540.4	540.4
62.5	513.0	494.8	538.6	538.6
100	512.0	494.0	537.6	537.6
250	511.0	492.5	536.3	536.3
500	510.0	492.0	535.6	535.6
600	510.0	492.0		
750	510.0	491.8		
Limit Margin (dB) :			24.88	24.88
Frequency (MHz) :			367.82	367.82

Delay Skew			
Freq. MHz	Worst case	LANmark Spec	TIA Spec
1-500	34.80	45	45

Low frequency measurements						
Parameter	Worst Case	Average	LANmark		TIA	
			Spec	Margin	Spec	Margin
Mutual capacitance (nF/100m)	4.34	4.12	5.10	0.76	5.60	1.26
Maximum Capacitance Unbalance Pair-to-Ground (pF/100m)	59.90	35.25	330.00	270.10	330.00	270.10
Conductor DC resistance (Ω)	7.36	7.17	9.38	2.02	9.38	2.02
DC Resistance Unbalance within a pair (%) using IEC calculation method	0.86%	0.25%	2.00%	1.14%	2.00%	1.14%

Legend : Blue - Worst Case; Green - Average; Red - TIA Specification; Black - LANmark Specification