



**ELECTRICAL TRANSMISSION PERFORMANCE TESTING OF
SCREENED CATEGORY 6 ISO/IEC, EN & TIA/EIA CONNECTING HARDWARE
ACCORDING TO REQUIREMENTS OF
2ND EDITION ISO/IEC 11801, CENELEC EN 50173-1,
ANSI/TIA/EIA-568-B.2-1 AND DRAFT IEC 60603-7-5**

**Produced by
Telebox Industries Corp.**

Screened Keystone Jack, Category 6, RJ 45
Telebox Identification, P/N TA8668SX

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Project No. 1041025

2005.05.20

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1. IDENTIFICATION

Project No.: 1041025

Subject: Electrical Transmission Performance Testing of Screened Category 6 ISO/IEC, EN & TIA/EIA Connecting Hardware according to Requirements of 2nd Edition ISO/IEC 11801, CENELEC EN 50173-1, ANSI/TIA/EIA-568-B.2-1 and Draft IEC 60603-7-5

Connecting Hardware: Screened, Category 6, RJ 45, Keystone Jack

Manufacturer: Telebox Industries Corp.
4F, No. 306, Tatung Road, Sec. 1
Hsichih-Taipei 221
Taiwan, R.O.C.

Supplier: Telebox Industries Corp.
4F, No. 306, Tatung Road, Sec. 1
Hsichih-Taipei 221
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Telebox Identification: P/N TA8668SX

PCB Marking: 001-8670 C6 1F00 N35 L09-0

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2. SURVEY OF THE WORK

3P has performed electrical transmission performance testing of samples of screened Category 6 keystone jack from Telebox Industries Corp., P/N TA8668SX. Samples of connecting hardware have been supplied for the testing at 3P by Telebox Industries Corp. in May 2005.

Testing was carried out in May 2005.

Testing has included a verification of performance according to all relevant international standards and standard proposals. This means that the following specifications stating electrical transmission requirements are covered by the present testing:

- ISO/IEC 2nd Edition 11801, Cat. 6
- CENELEC EN 50173-1, Cat. 6
- ANSI/TIA/EIA-568-B.2-1, Cat. 6
- IEC Draft 60603-7-5, Cat. 6

The transmission performance of the Screened Category 6 ISO/IEC, EN & TIA/EIA Keystone Jack from Telebox Industries Corp., P/N TA8668SX, having PCB marking 001-8670 C6 1F00 N35 L09-0, does in every respect comply with all specified requirements.

It should be noted that the present testing does not include the reliability test programmes specified in ISO/IEC, CENELEC, ANSI/TIA/EIA and draft IEC standards. Only the transmission performance is covered by the 3P testing. It is assumed that the contact reliability of the applied RJ 45 jacks is adequate to secure safe interconnection to the patch cords throughout a lifetime of normal application of the connecting hardware.

3. APPLIED SPECIFICATIONS

The transmission performance requirements of the following specifications have been covered by the connecting hardware testing:

- ISO/IEC 2nd Edition Generic Cabling Standard 11801, Cat. 6
- CENELEC Generic Cabling Standard EN 50173-1, Cat. 6
- ANSI/TIA/EIA Generic Cabling Standard 568-B.2-1, Cat. 6
- IEC Draft Connecting Hardware Standard 60603-7-5, Cat. 6

4. CONDITIONS OF TESTING

4.1 Connecting Hardware Types covered by the Transmission Testing

The transmission performance testing has been carried out on supplied samples of screened Category 6 keystone jack from Telebox Industries Corp., P/N TA8668SX. The marking of the PC boards was 001-8670 C6 1F00 N35 L09-0.

The testing only concerns verification of transmission performance for samples supplied to 3P by Telebox Industries Corp. in May 2005. The positive conclusion of the testing has not been verified by 3P to apply for any other samples or products from Telebox Industries Corp.

4.2 Electrical Measurements

The following electrical transmission parameters have been measured for all pairs or combination of pairs for the tested connecting hardware samples:

- Return loss from 1 MHz - 250 MHz, measured from both sides of the connecting hardware
- Attenuation from 1 MHz - 250 MHz
- Pair-pair near end crosstalk from 1 MHz - 250 MHz, measured from both sides of the connecting hardware
- Pair-pair far end crosstalk from 1 MHz - 250 MHz, measured for all 2×6 combinations of pairs
- DC resistance
- DC resistance unbalance
- Current carrying capacity
- Propagation delay from 1 MHz - 250 MHz
- Delay skew from 1 MHz - 250 MHz
- Coupling attenuation and EMC performance from 30 MHz - 1 GHz, recorded as both near and far end measurements
- Common mode balance from 1 MHz - 250 MHz, measured as TCL from both sides of the connecting hardware
- Transfer impedance
- Insulation resistance
- Voltage proof

The following instruments were applied for the electrical measurements:

- HP Network Analyzer, type 8753ES with Internal S-Parameter Test Set
- BH Electronics Baluns, type 040-0093
- 3P Baluns, type 3P-250-Cat6-C
- 3P Balun, type 3P-600-Cat7
- Rohde & Schwarz Absorbing Clamp, type MDS-21
- HP Milliohmmeter, type 4338A
- HP LCR Meter, type 4263A
- HP High Resistance Meter, type 4339A
- Danbridge Insulation Tester, type JP12A
- 3P Transfer Impedance test equipment

5. FACTORY INSPECTION

The testing only concerns verification of transmission performance for samples supplied to 3P by Telebox Industries Corp. in May 2005. No inspection of production line and quality assurance organization has been carried out.

6. SUMMARIZED TEST RESULTS

The electrical transmission performance testing has been carried out on samples of screened Category 6 keystone jack from Telebox Industries Corp., P/N TA8668SX. Measurements have been made to 250 MHz.

Summarized test results are presented in the following clauses, while recordings of electrical performance versus frequency are found in the appendix. The tables in the present section generally inform about the headroom to a specified worst case limiting function which is specified under the table concerned. The various recordings of electrical performance versus frequency in the appendix contains, in red colour, this limiting function specified for the parameter in question.

The transmission measurements have been carried out using the test configurations specified in the ISO/IEC, CENELEC, ANSI/TIA/EIA and draft IEC standards. This means that the following three conditions are covered by the testing:

1. All noise parameters are measured from both the plug and connecting block sides (for far end crosstalk with sending and receiving on each pair of a specific pair combination). For reasons of simplification only the worst case recordings of these two measurements are presented in the appendix. The summarised results of all bi-directional measurements are presented in the tables of the relevant sub-clause.
2. All electrical high frequency parameters have been measured using "common and differential mode" (Y-term.) termination.
3. The measurements of near end crosstalk has been carried out using all of the specified low, central and high limit de-embedded NEXT plugs. The worst case recordings in question are presented in the appendix. All summarised results of all low, central and high limit plug measurements are presented in the tables of clause 6.4.

The low limit plug is in the present report understood to be the plug having the lowest numerical de-embedded NEXT value, i.e. the "worst" NEXT performance, while the high limit plug is understood to be the plug having the highest numerical de-embedded NEXT value, i.e. the "best" NEXT performance. Both phase angle and absolute value of the applied plugs are in compliance with the requirements of all ISO/IEC, CENELEC, ANSI/TIA/EIA and draft IEC standards. However, only the measured low, central and high absolute de-embedded NEXT values at 100 MHz are presented in table 6.1.

6.1 De-Embedded NEXT Values of Applied RJ 45 Plugs

Summarized results of testing of the applied low, central and high limit plugs are found in table 6.1, and include all six pair combinations measured for absolute value at 100 MHz, as this is the spot frequency for which de-embedded NEXT performance is traditionally reported. Both absolute value and phase angle have been measured from 1 MHz to 250 MHz and comply with the specified limits in the full frequency range for all six pair combinations for all applied plugs.

However, for simplification these test data are neither presented in table 6.1 nor as recordings in the appendix.

Table 6.1 Summarized Results of De-Embedded NEXT Measurements of Absolute Value for Applied RJ 45 Plugs at 100 MHz

COMBINATION OF PAIRS	DE-EMBEDDED NEXT AT 100 MHz (dB)			
	<i>Absolute Value for Low Limit Plugs</i>	<i>Absolute Value for Central Limit Plug</i>	<i>Absolute Value for High Limit Plugs</i>	<i>Specified Covered Range</i>
1/2 - 3/6	46,5	-	49,5	46,5 - 49,5
1/2 - 4/5	57,0	-	70,0	57,0 - 70,0
1/2 - 7/8	60,0	-	-	Max. 60,0
3/6 - 4/5	36,4	-	37,6	36,4 - 37,6
3/6 - 4/5	-	37,0	-	36,8 - 37,2
3/6 - 7/8	46,5	-	49,5	46,5 - 49,5
4/5 - 7/8	57,0	-	70,0	57,0 - 70,0

It is concluded from table 6.1 and testing performed at 3P that the performance of the applied test plugs complies with the specified Category 6 requirements in the complete frequency range from 1 MHz to 250 MHz.

6.2 Return Loss

Summarized results of the testing are found in table 6.2, and include all four tested pairs measured from both sides of the connecting hardware. Worst case recordings of return loss versus frequency covering both sides of the connecting hardware are found in page 19 of the appendix.

Table 6.2 Summarized Results of Return Loss Measurements from 1 MHz to 250 MHz

PAIR	RETURN LOSS MARGIN TO LIMIT (dB) ^{1,2}
1/2	3,6 (3,6)
3/6	1,6 (1,3)
4/5	1,7 (1,6)
7/8	1,8 (1,4)

¹: Return Loss requirements are defined by the function:

$$64-20\log(f) \text{ dB,}$$

where f is frequency in MHz. Calculated requirements below 30 dB are equaled to this value.

²: The first value is measurement from the RJ 45 plug side, while the corresponding measurement from the connecting block side is presented in brackets.

It is concluded from table 6.2 and return loss recordings in page 19 that return loss complies with the specified Category 6 requirements in the complete frequency range from 1 MHz to 250 MHz for both sides of the connecting hardware.

6.3 Attenuation

Summarized results of the testing are found in table 6.3, and include all four tested pairs measured from one side of the connecting hardware. Recordings of attenuation versus frequency are found in page 20 of the appendix.

Table 6.3 Summarized Results of Attenuation Measurements from 1 MHz to 250 MHz

PAIR	MAX. ATTENUATION (dB) ¹					ATTENUATION MARGIN TO LIMIT (%) ¹
	1 MHz	10 MHz	100 MHz	200 MHz	250 MHz	1 - 250 MHz
1/2	0,00	0,02	0,06	0,16	0,21	32
3/6	0,00	0,02	0,07	0,20	0,31	3
4/5	0,00	0,02	0,06	0,17	0,24	25
7/8	0,00	0,02	0,07	0,17	0,23	26
Specified	0,10	0,10	0,20	0,28	0,32	0

¹: Attenuation requirements are defined by the function:

$$0,02\sqrt{f} \text{ dB,}$$

where f is frequency in MHz. Calculated requirements below 0,1 dB are equaled to this value.

It is concluded from table 6.3 and attenuation recordings in page 20 that attenuation complies with the specified Category 6 requirements in the complete frequency range from 1 MHz to 250 MHz.

6.4 Near End Crosstalk

Summarized results of the testing are found in table 6.4, and include all six combinations of the four tested pairs measured from both sides of the connecting hardware. Worst case recordings of pair-pair near end crosstalk versus frequency for both low, central and high limit plug measurements, each covering both sides of the connecting hardware, are found in pages 21 - 27 of the appendix.

Table 6.4 Summarized Results of Pair - Pair Near End Crosstalk Measurements from 1 MHz to 250 MHz

COMBINATION OF PAIRS	PAIR - PAIR NEXT MARGIN TO LIMIT (dB) ^{1,2}		
	<i>Low Limit Plug</i>	<i>Central limit plug</i>	<i>High Limit Plug</i>
1/2 - 3/6	7,7 (1,5)	- (-)	1,0 (0,3)
1/2 - 4/5	1,2 (5,2)	- (-)	3,6 (8,9)
1/2 - 7/8	5,7 (6,5)	- (-)	- (-)
3/6 - 4/5	1,0 (2,9)	3,0 (6,7)	5,7 (9.9)
3/6 - 7/8	4,0 (3,2)	- (-)	6,0 (1,9)
4/5 - 7/8	1,7 (3,5)	- (-)	3,7 (13,9)

¹: Pair-Pair Near End Crosstalk requirements are defined by the function:

For all pair combinations except 3/6 - 4/5, low and high limit plugs: $94,0 - 20\log(f)$ dB

For 3/6 - 4/5, low and high limit plugs: $92,5 - 20\log(f)$ dB,

where f is frequency in MHz. Calculated requirements more strict than 80 dB are equaled to this value.

²: The first value is measurement from the RJ 45 plug side, while the corresponding measurement from the connecting block side is presented in brackets. For pair combinations 1/2-3/6, 1/2-4/5, 1/2-7/8, 3/6-7/8 and 4/5-7/8 the central limit plug measurements are not specified. For pair combination 1/2-7/8 the high limit plug measurement is not specified.

It is concluded from table 6.4 and pair - pair near end crosstalk recordings in pages 21 - 27 that pair - pair near end crosstalk complies with the specified Category 6 requirements in the complete frequency range from 1 MHz to 250 MHz for all six combinations of plug performance limit and sides of connecting hardware.

The documentation of power sum near end crosstalk has not been included in the present testing as only informative limits are proposed in ISO/IEC 11801, and ANSI/TIA/EIA-568-B.2-1 does not specify this parameter.

6.5 Far End Crosstalk

Summarized results of the testing are found in tables 6.5 for pair-pair far end crosstalk and include all 2×6 combinations of the four tested pairs. Worst case recordings of pair-pair far end crosstalk versus frequency covering all 2×6 combinations of the four tested pairs are found in page 28 of the appendix.

Table 6.5 Summarized Results of Pair - Pair Far End Crosstalk Measurements from 1 MHz to 250 MHz

COMBINATION OF PAIRS	PAIR - PAIR FEXT MARGIN TO LIMIT (dB) ^{1,2}
1/2 - 3/6	11,0 (10,1)
1/2 - 4/5	12,2 (11,6)
1/2 - 7/8	32,9 (35,1)
3/6 - 4/5	8,3 (10,4)
3/6 - 7/8	12,2 (12,0)
4/5 - 7/8	8,8 (8,9)

¹: Pair-Pair Far End Crosstalk requirements are defined by the function:

$$83,1-20\log(f) \text{ dB,}$$

where f is frequency in MHz. Calculated requirements more strict than 75 dB are equaled to this value.

²: The first value is measurement with signal injection on the first of the listed pairs, while the corresponding measurement with signal injection on the second of the listed pairs is presented in brackets.

It is concluded from table 6.5 and pair - pair far end crosstalk recordings in page 28 that pair - pair far end crosstalk complies with the specified Category 6 requirements in the complete frequency range from 1 MHz to 250 MHz for all 2×6 pair combinations.

The documentation of power sum far end crosstalk has not been included in the present testing as only informative limits are proposed in ISO/IEC 11801, and ANSI/TIA/EIA-568-B.2-1 does not specify this parameter.

6.6 Input to Output Resistance

Results of the testing are found in table 6.6, and include all 8 tested conductors measured from one side of the connecting hardware.

Table 6.6 Results of Input to Output Resistance Measurements

CONDUCTOR PATH	INPUT TO OUTPUT RESISTANCE (mΩ)
1	64
2	66
3	43
6	28
4	37
5	60
7	63
8	66
Specified	Max. 200

It is concluded from table 6.6 that input to output resistance complies with the specified Category 6 requirements.

6.7 Input to Output Resistance Unbalance

The worst case value of input to output resistance unbalance is 38 mΩ, which is in compliance with the specified max. 50 mΩ.

It is concluded that input to output resistance unbalance complies with the specified Category 6 requirements.

6.8 Current Carrying Capacity

Current carrying capacity has been measured by subjecting each conductor and the screen to a simultaneous exposure of 0,75 A at 60°C for 30 minutes.

The increase in temperature was 6°C, which is in compliance with the specified max. 30°C. Continuity of conductor and screen paths was maintained. No degradation of connecting hardware was observed after the testing.

It is concluded that current carrying capacity complies with the specified Category 6 requirements.

6.9 Propagation Delay

Summarized results of the testing are found in table 6.9, and include all four tested pairs measured from one side of the connecting hardware.

Table 6.9 Summarized Results of Propagation Delay Measurements from 1 MHz to 250 MHz

PAIR	PROPAGATION DELAY (nsec)
1/2	Max. 0,6
3/6	Max. 0,6
4/5	Max. 0,6
7/8	Max. 0,6
Specified	Max. 2,5

It is concluded from table 6.9 that propagation delay complies with the specified Category 6 requirements in the complete frequency range from 1 MHz to 250 MHz.

6.10 Delay Skew

Summarized results of the testing are found in table 6.10, and include all six combinations of the four tested pairs measured from one side of the connecting hardware.

Table 6.10 Summarized Results of Delay Skew Measurements from 1 MHz to 250 MHz

COMBINATION OF PAIRS	DELAY SKEW (nsec)
1/2 - 3/6	Max. 0,04
1/2 - 4/5	Max. 0,05
1/2 - 7/8	Max. 0,00
3/6 - 4/5	Max. 0,01
3/6 - 7/8	Max. 0,04
4/5 - 7/8	Max. 0,05
Specified	Max. 1,25

It is concluded from table 6.10 that delay skew complies with the specified Category 6 requirements in the complete frequency range from 1 MHz to 250 MHz.

6.11 Electromagnetic Performance

Summarized results of coupling attenuation measurements are found in table 6.11, and include all four tested pairs recorded as both near and far end measurements. The connecting hardware is connected with overall foil and braid screened horizontal cable and RJ 45 plug terminated individual foil and overall braid screened flexible cable. Worst case recording of electromagnetic performance is found in page 29 of the appendix.

Table 6.11 Summarized Results of Coupling Attenuation Measurements

PAIR	COUPLING ATTENUATION MARGIN TO LIMIT (dB) ¹
1/2	30
3/6	26
4/5	33
7/8	28

¹: Coupling attenuation requirements are defined by the function:

35 dB between 30 MHz and 100 MHz

$35 - 20 \log\left(\frac{f}{100}\right)$ dB between 100 MHz and 1 GHz,

where f is frequency in MHz.

The presented results are worst case of near and far end measurements.

It is concluded from table 6.11 and coupling attenuation recordings in page 29 that coupling attenuation complies with the specified Category 6 requirements when recorded as both near and far end measurement.

6.12 Balance Measured as Transverse Conversion Loss (TCL)

Summarized results of the testing are found in table 6.12 for balance measured as TCL, and include all four tested pairs measured from both sides of the connecting hardware. Worst case recordings of TCL versus frequency from both sides of the connecting hardware are found in page 30 of the appendix.

Table 6.12 Summarized Results of Balance (TCL) Measurements from 1 MHz to 250 MHz

PAIR	BALANCE (TCL) MARGIN TO LIMIT (dB) ^{1,2}
1/2	12,0 (10,2)
3/6	13,6 (9,0)
4/5	16,0 (19,1)
7/8	15,7 (18,4)

¹: Requirements to Balance, measured as TCL, are defined by the function:

$68 - 20 \log(f)$ dB,

where f is frequency in MHz. Calculated requirements more strict than 60 dB are equaled to this value.

²: The first value is measurement from the RJ 45 plug side, while the corresponding measurement from the connecting block side is presented in brackets.

It is concluded from table 6.12 and the TCL recordings in page 30 that the transverse conversion loss (balance) complies with the specified Category 6 requirements in the complete frequency

range from 1 MHz to 250 MHz for both sides of connecting hardware.

6.13 Transfer Impedance

Transfer impedance measurements have been carried out on a sample of keystone jack supplied to 3P in March 2002. This sample had identical housing, i.e. screening, as the later supplied samples for transmission performance testing, but different circuitry. This earlier supplied sample was only applied for the transfer impedance measurement.

Summarized results of the testing are found in table 6.13, and include measurements of the connecting hardware before and after ageing at 70 °C for 21 days. The connecting hardware was connected with short lengths of overall foil screened horizontal cable and RJ 45 plug terminated overall foil and braid screened flexible cable. Recordings of transfer impedance before and after ageing are found in page 31 of the appendix.

Table 6.13 Summarized Results of Transfer Impedance Measurements

CONDITION	TRANSFER IMPEDANCE MARGIN TO LIMIT (%) ¹
Before ageing	19
After Ageing	4

¹: Transfer Impedance requirements are defined by the function:

$40\sqrt{f}$ mΩ between 1 MHz and 4 MHz

$20 \cdot f$ mΩ between 4 MHz and 100 MHz,

where f is frequency in MHz.

It is concluded from table 6.13 and transfer impedance recordings in page 31 that transfer impedance complies with the specified Category 6 requirements both before and after ageing at 70 °C for 21 days.

6.14 Insulation Resistance

The worst case insulation resistance between any combination of conductors is 47.000.000 MΩ, which is in compliance with the specified min. 100 MΩ. The applied test voltage was 500 Vdc.

It is concluded that insulation resistance complies with the specified Category 6 requirements.

6.15 Voltage Proof

No flash-over, breakdown or other deterioration was found by application of 1000 Vdc between any combination of conductors and by application of 1500 Vdc between screen and conductors.

It is concluded that the voltage proof performance complies with the specified Category 6 requirements.

7. CONCLUSION

Samples of screened Category 6 keystone jack from Telebox Industries Corp. have been subjected to electrical transmission performance testing according to 3P requirements for Screened Category 6 ISO/IEC, EN & TIA/EIA Connecting Hardware.

The transmission performance of the screened Category 6 keystone jack from Telebox Industries Corp., P/N TA8668SX, having PCB marking 001-8670 C6 1F00 N35 L09-0, does in every respect comply with the requirements of the following international standards and standard proposals:

- ISO/IEC 2nd Edition 11801, Cat. 6
- CENELEC EN 50173-1, Cat. 6
- ANSI/TIA/EIA-568-B.2-1, Cat. 6
- IEC Draft 60603-7-5, Cat. 6

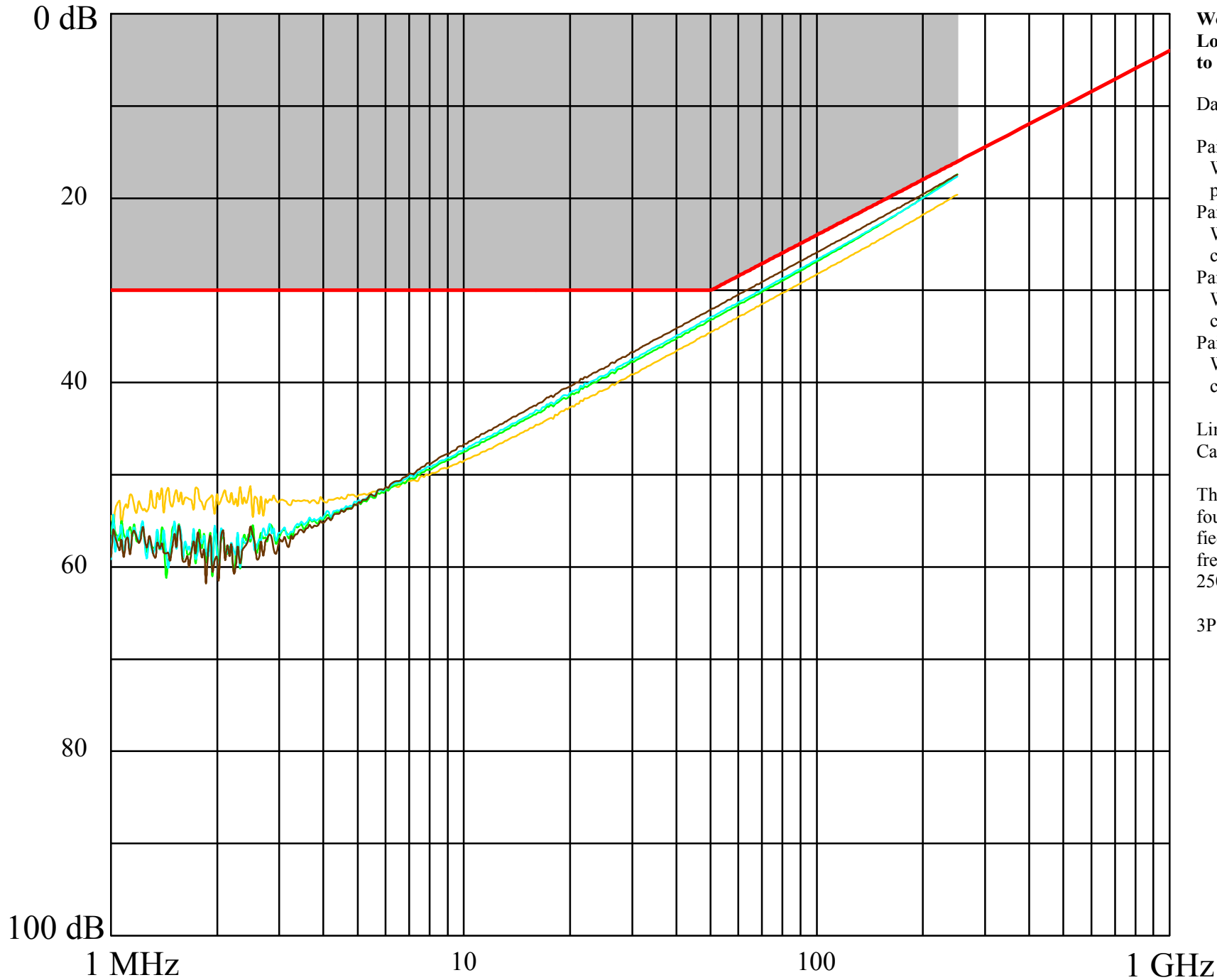
The testing only concerns verification of transmission performance for samples supplied to 3P by Telebox Industries Corp. in May 2005. The positive conclusion of the testing has not been verified by 3P to apply for any other samples or products from Telebox Industries Corp.

It should be noted that the present testing does not include the reliability test programmes specified in ISO/IEC, CENELEC, ANSI/TIA/EIA and draft IEC standards. Only the transmission performance is covered by the 3P testing. It is assumed that the contact reliability of the applied RJ 45 jacks is adequate to secure safe interconnection to the patch cords throughout a lifetime of normal application of the connecting hardware.

8. APPENDIX: Data Sheets of Transmission Performance versus Frequency

All characteristic and most critical recordings of transmission performance are presented in the following way:

- Page 19 Worst case recordings of return loss for all four pairs between 1 MHz and 250 MHz.
- Page 20 Recordings of attenuation for all four pairs between 1 MHz and 250 MHz.
- Pages 21 - 27 Worst case recordings of pair-pair near end crosstalk for all six combinations of pairs between 1 MHz and 250 MHz. Each page includes recordings of one specific pair combination measured using low and, if applicable, high limit plugs. For pair combination 3/6 - 4/5 the worst case central limit plug recording is presented in a separate page due to the different mated pair performance limits specified for low/high and central limit plugs.
- Page 28 Worst case recordings of pair-pair far end crosstalk for all 2×6 combinations of pairs between 1 MHz and 250 MHz.
- Page 29 Worst case recording of electromagnetic performance between 30 MHz and 1 GHz.
- Page 30 Worst case recordings of balance measured as TCL for all four pairs between 1 MHz and 250 MHz.
- Page 31 Recordings of transfer impedance between 1 MHz and 100 MHz before and after ageing.



Worst case recordings of Return Loss for all four pairs from 1 MHz to 250 MHz.

Date: 2005.05.11

Pair 1/2: —
Worst case is measurement from plug side.

Pair 3/6: —
Worst case is measurement from connecting block side.

Pair 4/5: —
Worst case is measurement from connecting block side.

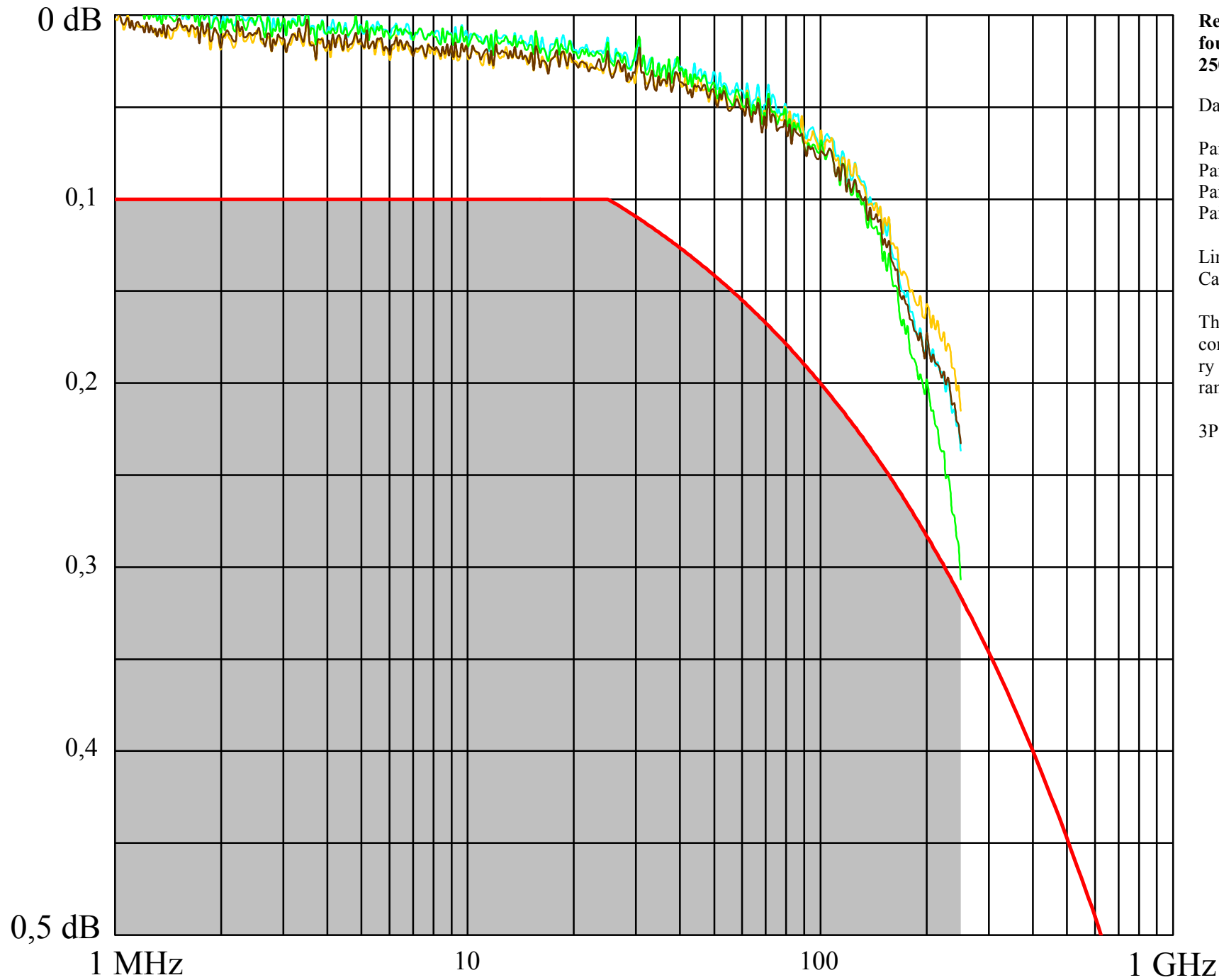
Pair 7/8: —
Worst case is measurement from connecting block side.

Limiting function: —

Category 6 limit:

The worst case of Return Loss for all four pairs complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

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Recordings of Attenuation for all four pairs from 1 MHz to 250 MHz.

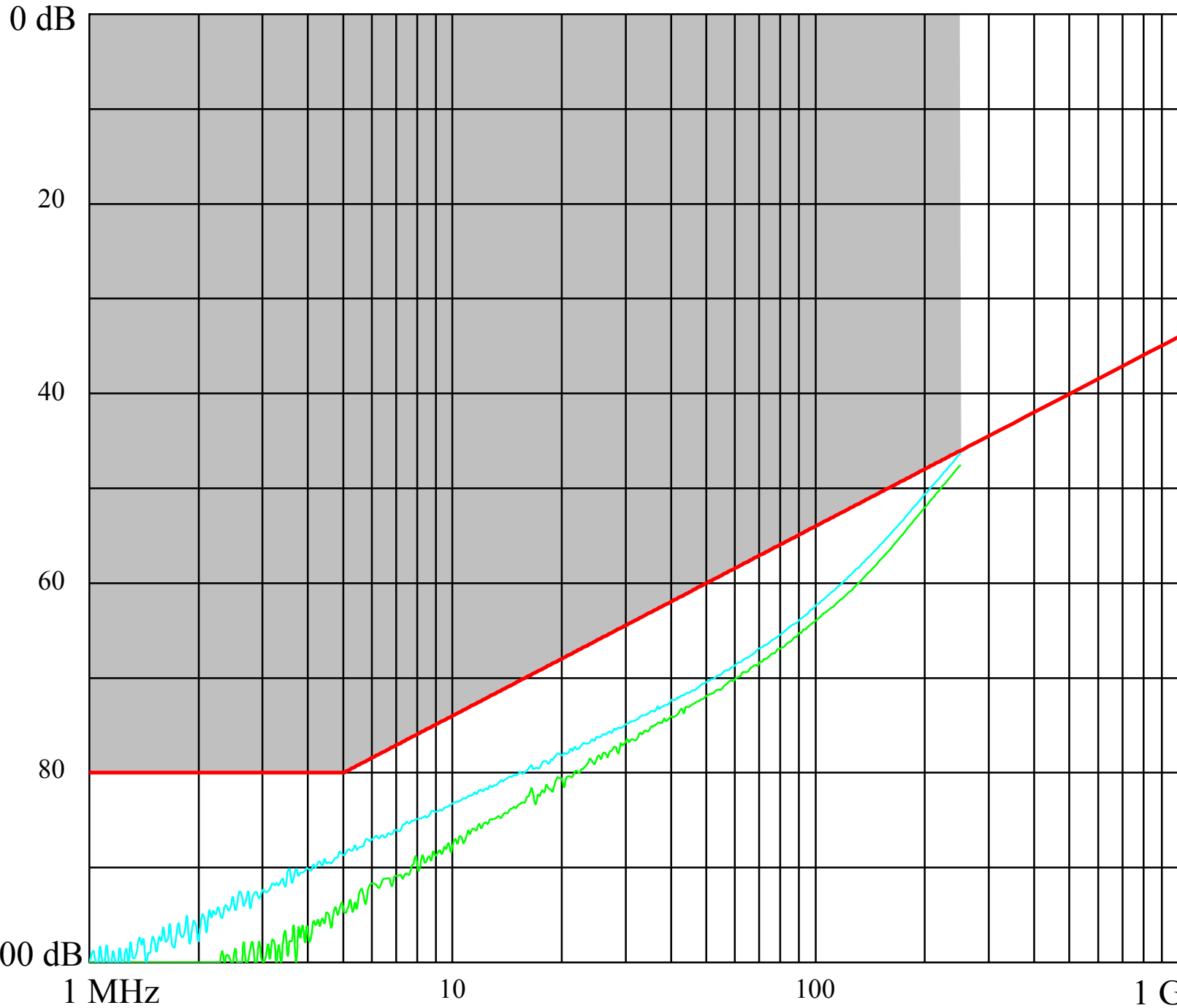
Date: 2005.05.11

Pair 1/2: —
 Pair 3/6: —
 Pair 4/5: —
 Pair 7/8: —

Limiting function: —
 Category 6 limit:

The Attenuation for all four pairs complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

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Worst case recordings of Near End Crosstalk for pair combination 1/2 - 3/6 measured with low and high limit plugs from 1 MHz to 250 MHz.

Date: 2005.05.12

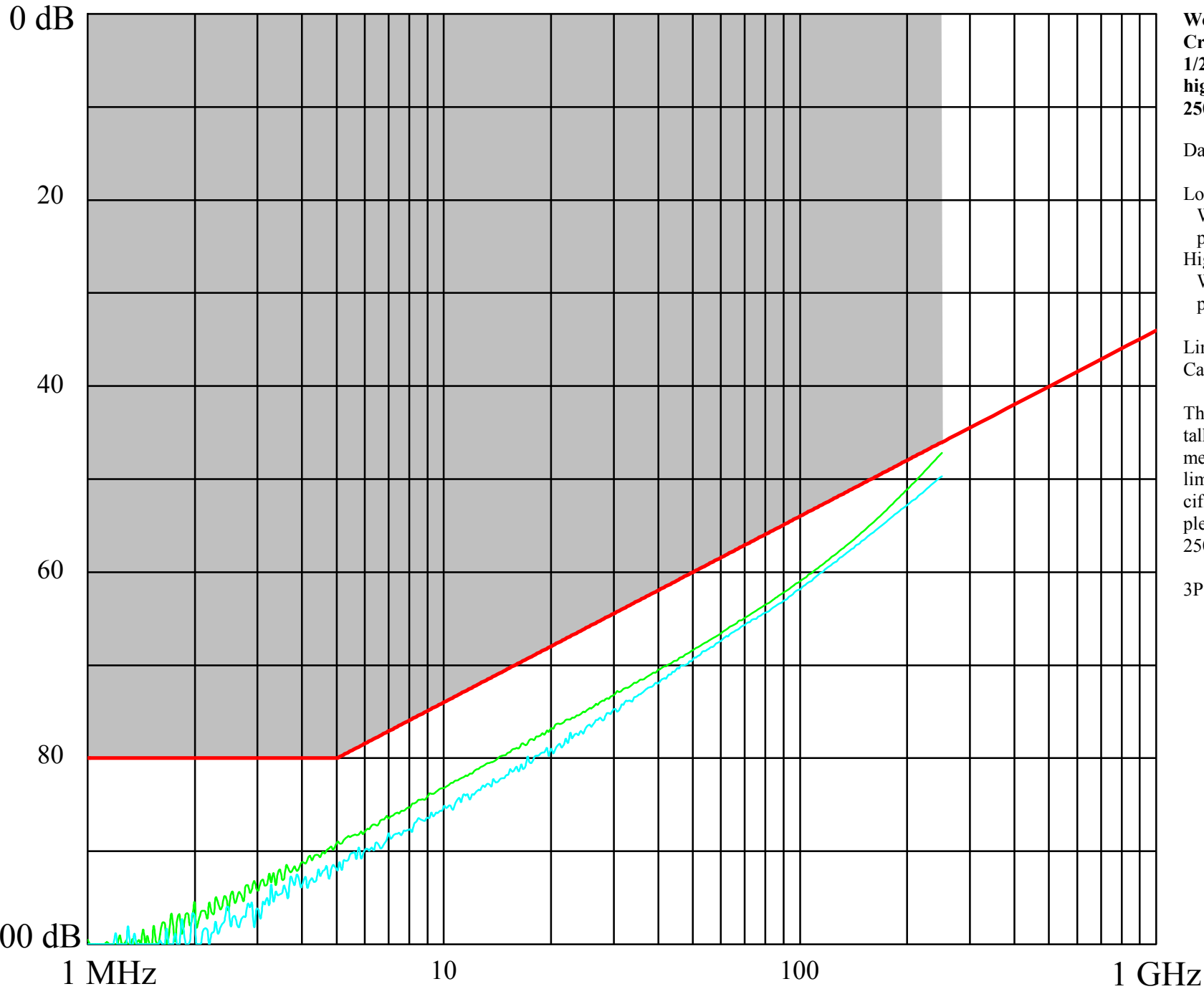
Low limit plug [46,5 dB]: —
 Worst case is measurement from connecting block side.
 High limit plug [49,5 dB]: —
 Worst case is measurement from connecting block side.

Limiting function: —

Category 6 limit:

The worst case of Near End Crosstalk for pair combination 1/2 - 3/6 measured with both low and high limit plugs complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

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Worst case recordings of Near End Crosstalk for pair combination 1/2 - 4/5 measured with low and high limit plugs from 1 MHz to 250 MHz.

Date: 2005.05.12

Low limit plug [57,0 dB]: —
Worst case is measurement from plug side.

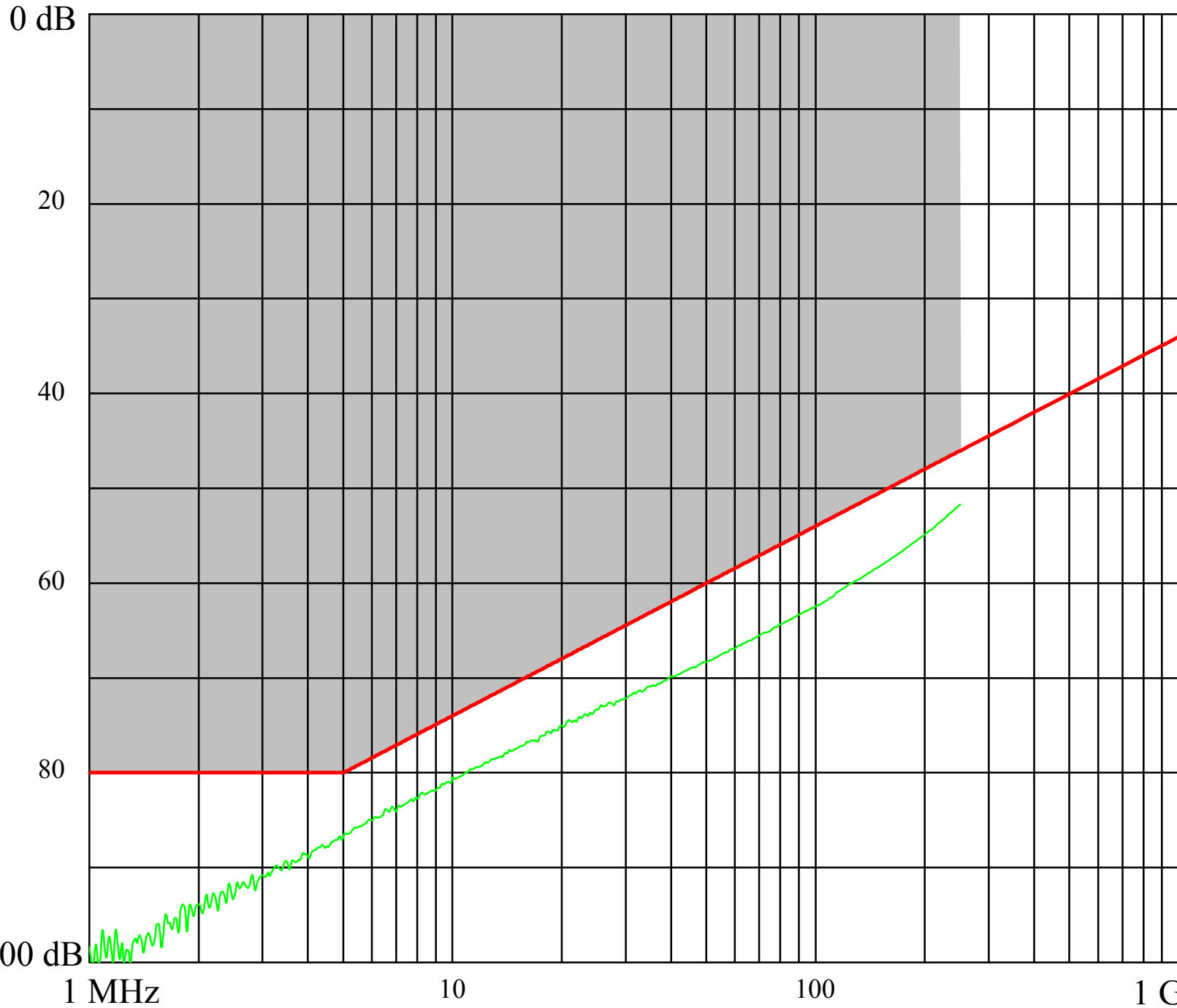
High limit plug [70,0 dB]: —
Worst case is measurement from plug side.

Limiting function: —

Category 6 limit:

The worst case of Near End Crosstalk for pair combination 1/2 – 4/5 measured with both low and high limit plugs complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

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Worst case recording of Near End Crosstalk for pair combination 1/2 - 7/8 measured with low limit plug from 1 MHz to 250 MHz.

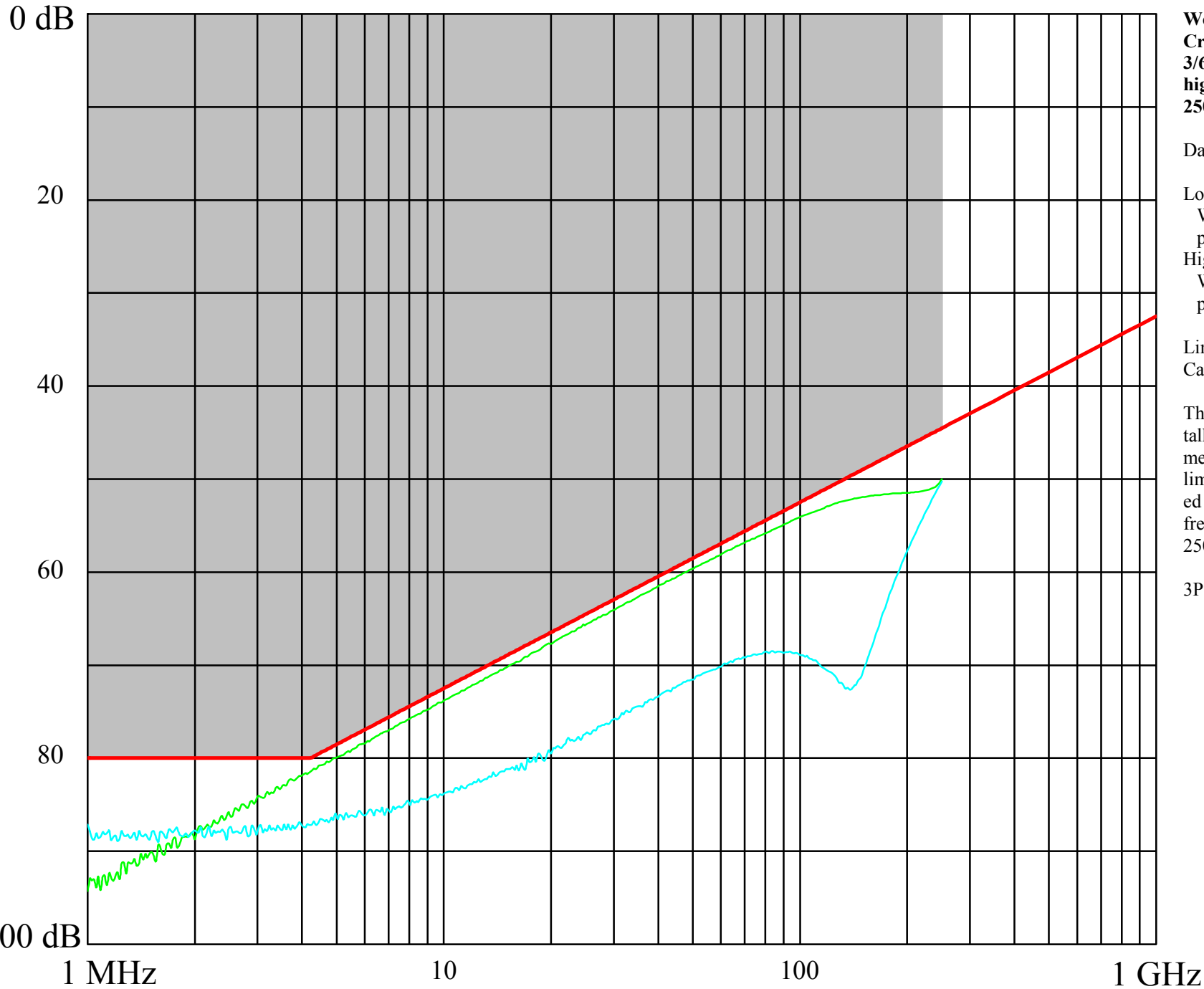
Date: 2005.05.12

Low limit plug [60,0 dB]: █
 Worst case is measurement from plug side.

Limiting function: █
 Category 6 limit:

The worst case of Near End Crosstalk for pair combination 1/2 - 7/8 measured with low limit plug complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

3P Project No. 1041025



Worst case recordings of Near End Crosstalk for pair combination 3/6 - 4/5 measured with low and high limit plugs from 1 MHz to 250 MHz.

Date: 2005.05.12

Low limit plug [36,4 dB]: —
Worst case is measurement from plug side.

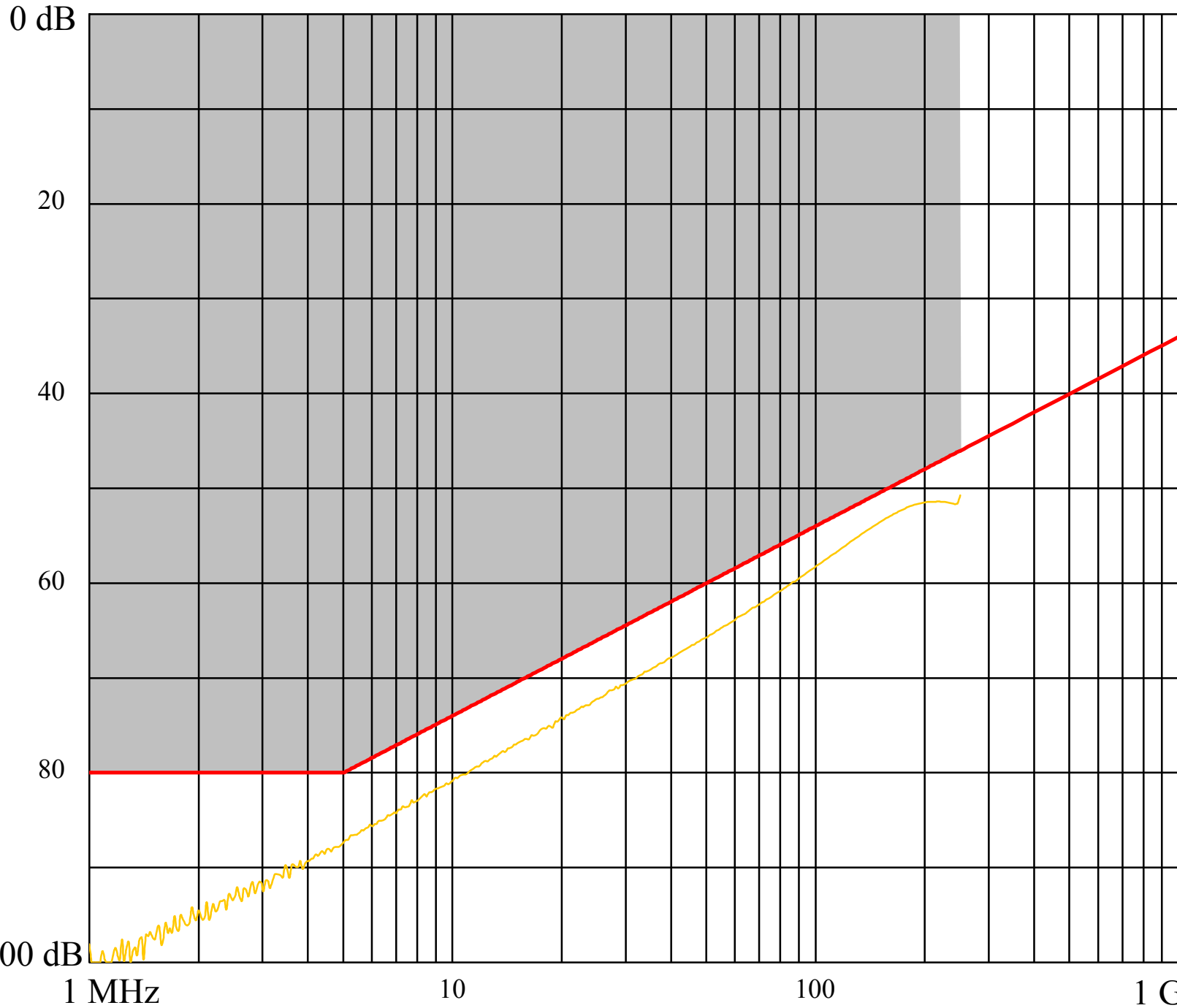
High limit plug [37,6 dB]: —
Worst case is measurement from plug side.

Limiting function: —

Category 6 limit:

The worst case of Near End Cross-talk for pair combination 3/6 - 4/5 measured with both low and high limit plugs complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

3P Project No. 1041025



Worst case recording of Near End Crosstalk for pair combination 3/6 - 4/5 measured with central limit plug from 1 MHz to 250 MHz.

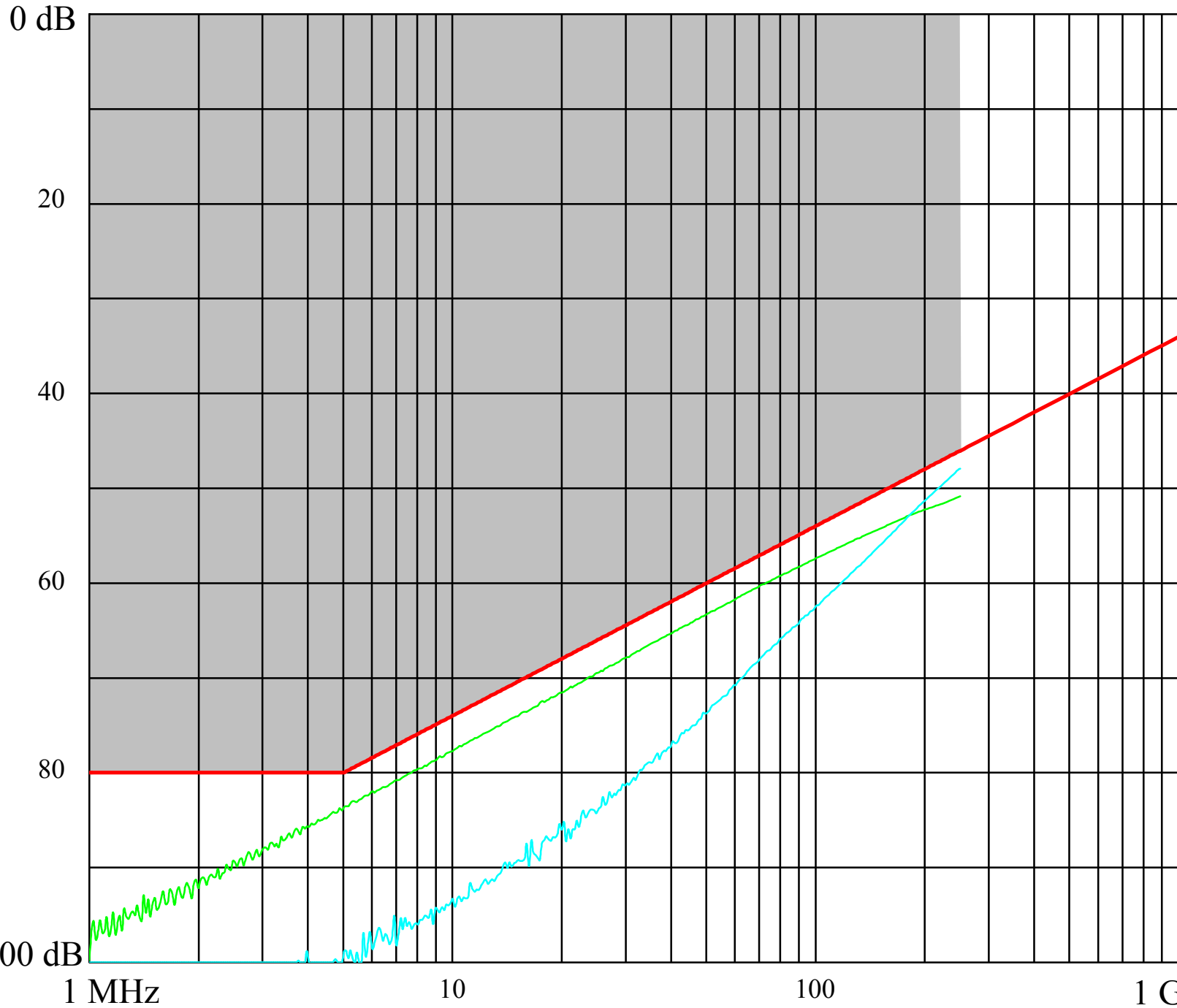
Date: 2005.05.12

Central limit plug [37,0 dB]: —
 Worst case is measurement from plug side.

Limiting function: —
 Category 6 limit: ■

The worst case of Near End Crosstalk for pair combination 3/6 - 4/5 measured with central limit plug complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

3P Project No. 1041025



Worst case recordings of Near End Crosstalk for pair combination 3/6 - 7/8 measured with low and high limit plugs from 1 MHz to 250 MHz.

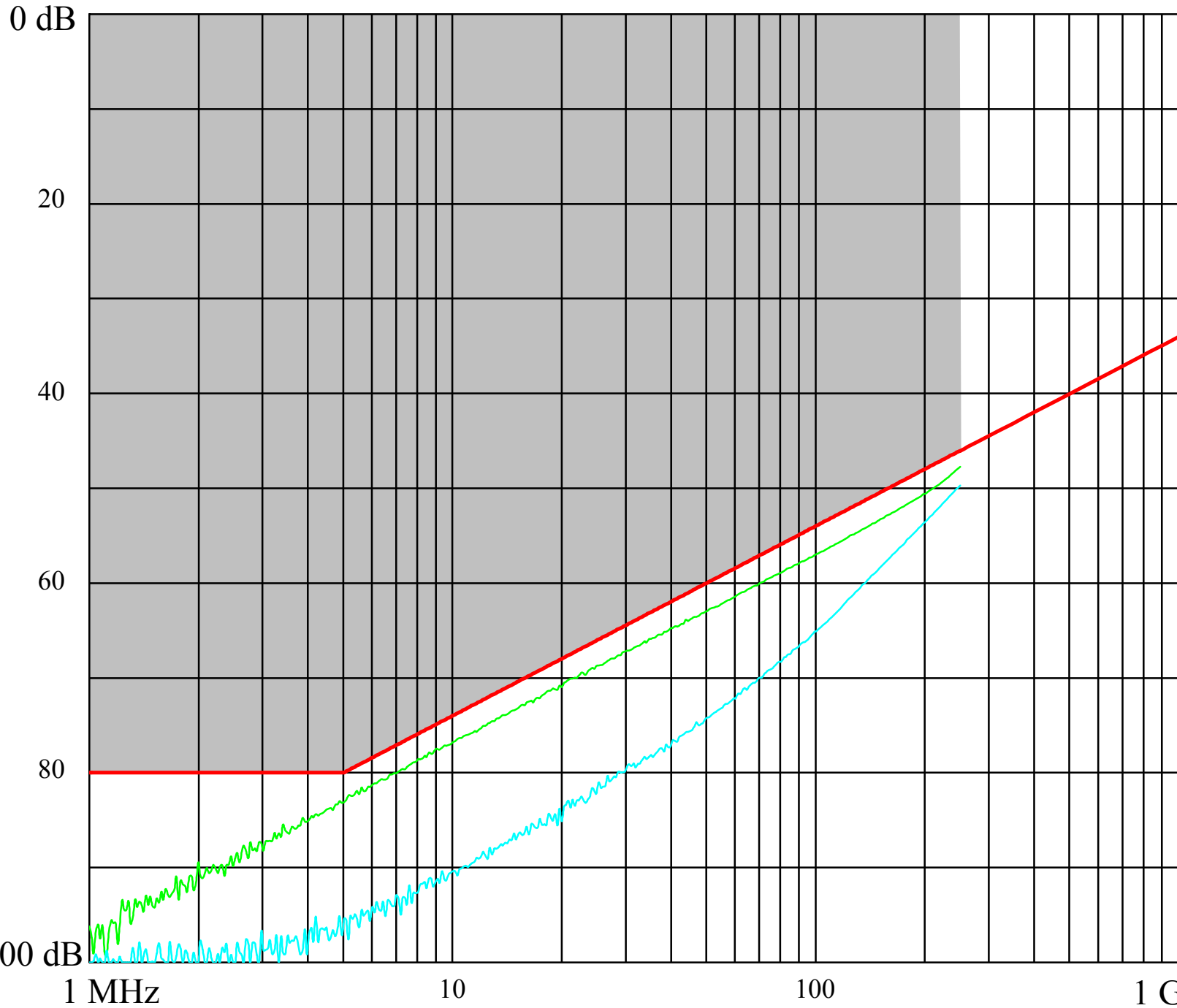
Date: 2005.05.12

Low limit plug [46,5 dB]: —
 Worst case is measurement from connecting block side.
 High limit plug [49,5 dB]: —
 Worst case is measurement from connecting block side.

Limiting function: —
 Category 6 limit:

The worst case of Near End Crosstalk for pair combination 3/6 - 7/8 measured with both low and high limit plugs complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

3P Project No. 1041025



Worst case recordings of Near End Crosstalk for pair combination 4/5 - 7/8 measured with low and high limit plugs from 1 MHz to 250 MHz.

Date: 2005.05.12

Low limit plug [57,0 dB]: —
 Worst case is measurement from plug side.

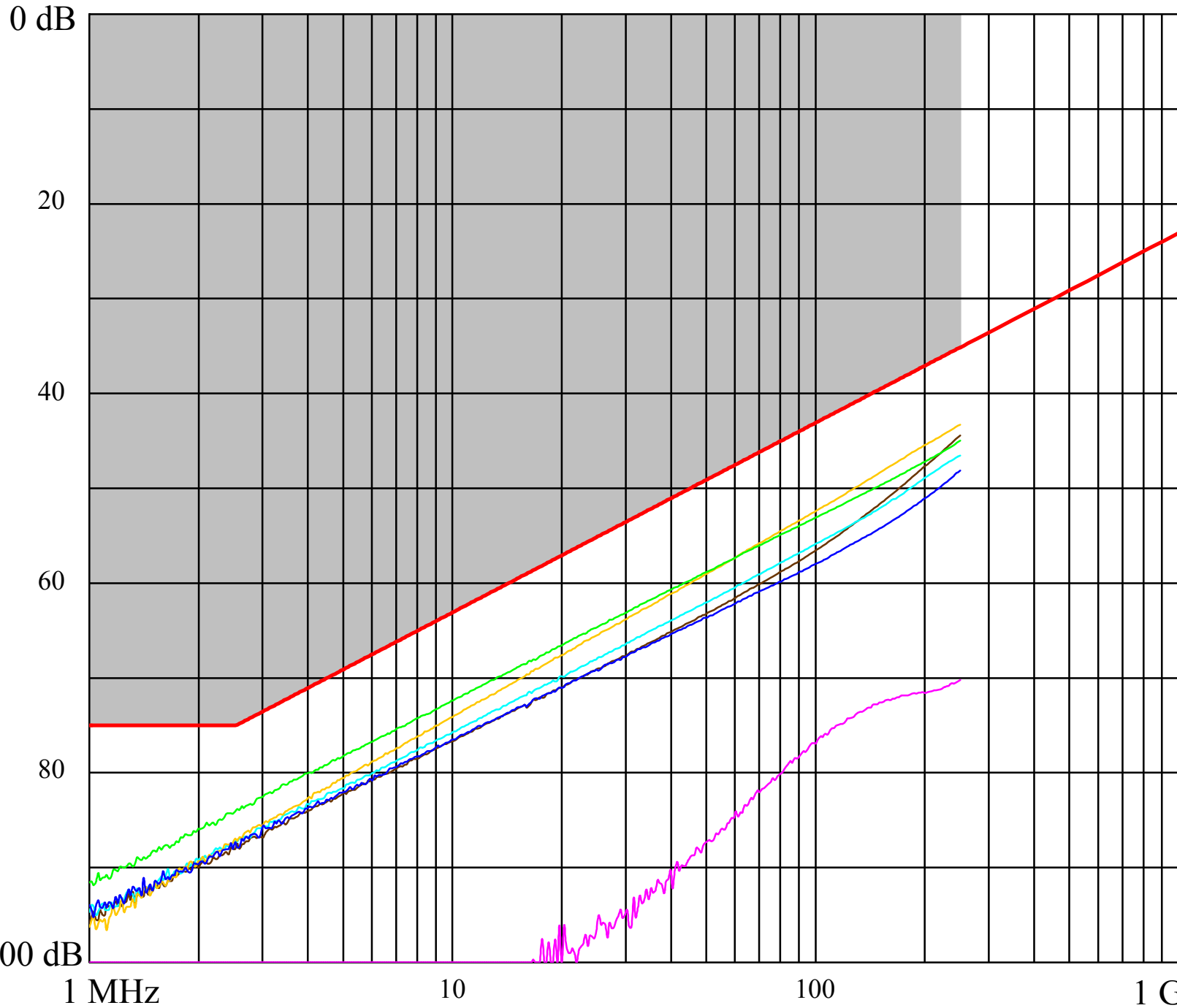
High limit plug [70,0 dB]: —
 Worst case is measurement from plug side.

Limiting function: —

Category 6 limit:

The worst case of Near End Crosstalk for pair combination 4/5 - 7/8 measured with both low and high limit plugs complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

3P Project No. 1041025



Worst case recordings of Far End Crosstalk for all six pair combinations from 1 MHz to 250 MHz.

Date: 2005.05.13

Pair combination 1/2 – 3/6: —
Worst case is signal injection on pair 3/6.

Pair combination 1/2 – 4/5: —
Worst case is signal injection on pair 4/5.

Pair combination 1/2 – 7/8: —
Worst case is signal injection on pair 1/2.

Pair combination 3/6 – 4/5: —
Worst case is signal injection on pair 3/6.

Pair combination 3/6 – 7/8: —
Worst case is signal injection on pair 7/8.

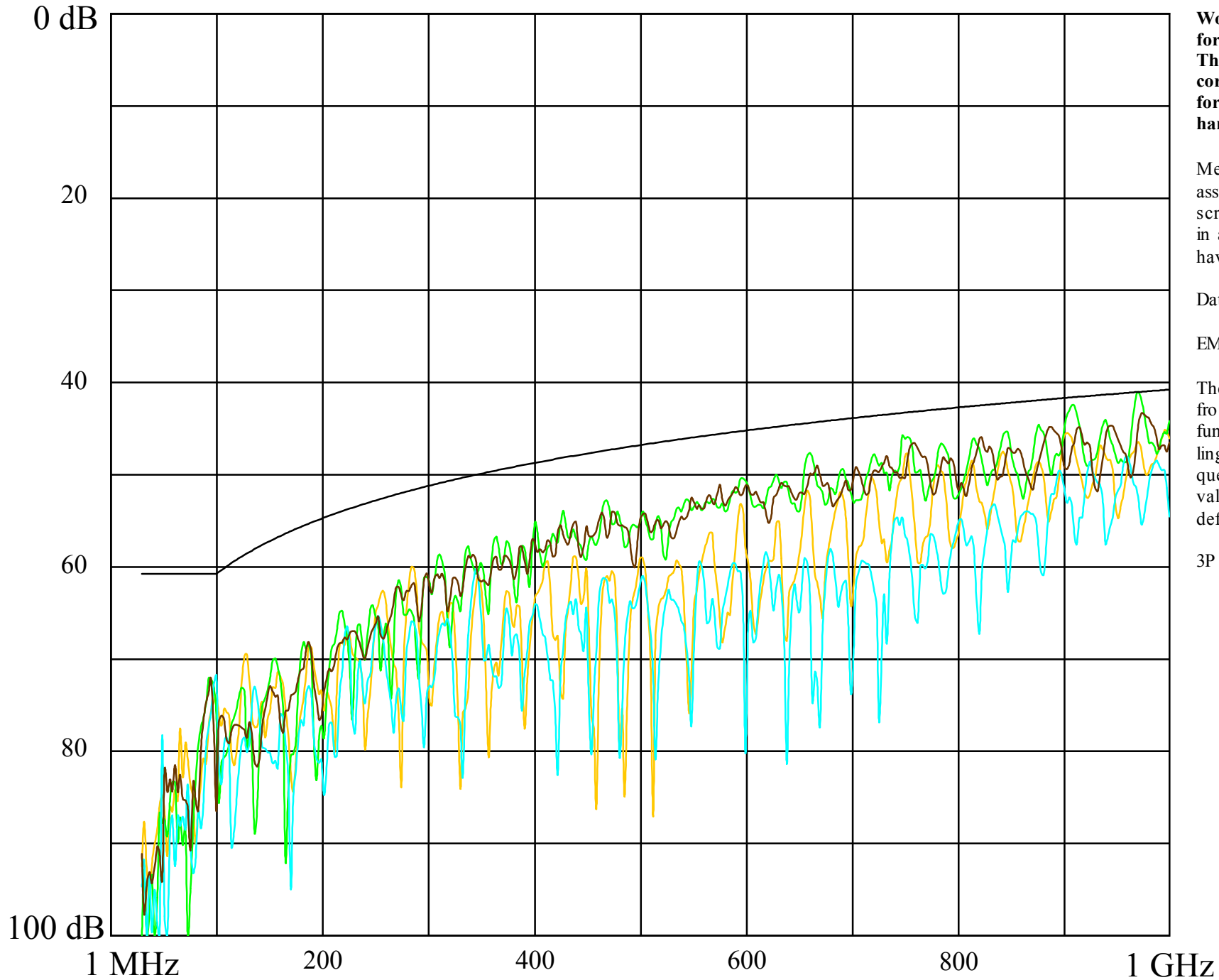
Pair combination 4/5 – 7/8: —
Worst case is signal injection on pair 4/5.

Limiting function: —

Category 6 limit:

The worst case of Far End Crosstalk for all six pair combinations complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

3P Project No. 1041025



Worst case recording of EMC Performance from 30 MHz to 1 GHz. The measurement is based on recordings of Coupling Attenuation for all four pairs of the connecting hardware.

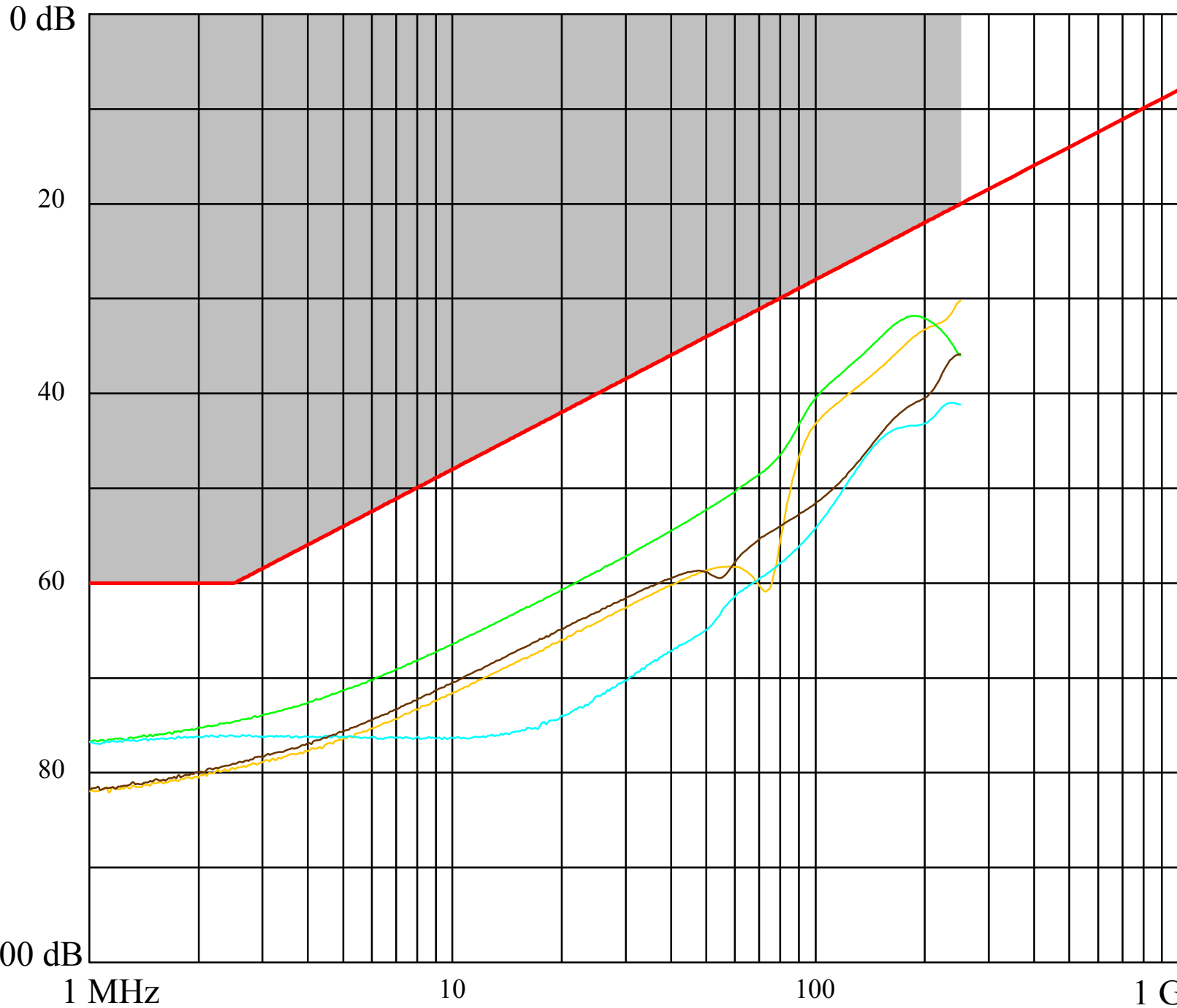
Measured on connecting hardware assembled with overall foil and braid screened Category 6 cable and tested in aerial span. The cable alone was having EMC performance of 93 dB.

Date: 2005.05.18

EMC Performance: 61 dB

The EMC Performance is derived from the interception of a limiting function with the worst case Coupling Attenuation value at any frequency for any pair. The constant value from 30 MHz to 100 MHz is defined as the EMC performance.

3P Project No. 1041025



Worst case recordings of Transverse Conversion Loss (TCL) for all four pairs from 1 MHz to 250 MHz.

Date: 2005.05.13

Pair 1/2: —
Worst case is measurement from connecting block side.

Pair 3/6: —
Worst case is measurement from connecting block side.

Pair 4/5: —
Worst case is measurement from plug side.

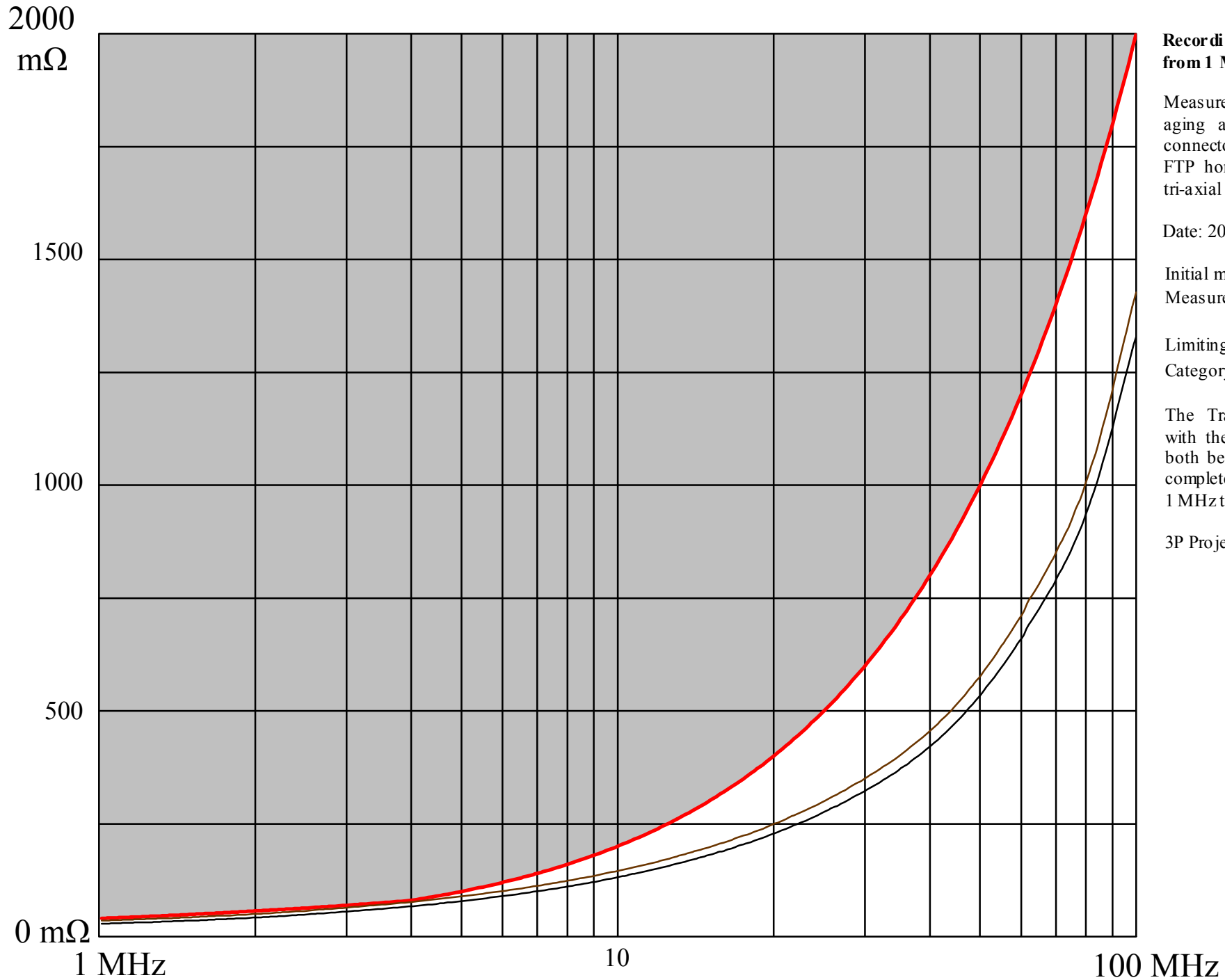
Pair 7/8: —
Worst case is measurement from plug side.

Limiting function: —

Category 6 limit:

The worst case of Transverse Conversion Loss for all four pairs complies with the specified Category 6 limit in the complete frequency range from 1 MHz to 250 MHz.

3P Project No. 1041025



Recordings of Transfer Impedance from 1 MHz to 100 MHz.

Measured on sample before and after aging at 70°C for 21 days. The connector is tested terminated with FTP horizontal cable, in 0,3 metre tri-axial method tube.

Date: 2002.03.27

Initial measurement: —

Measurement after ageing: —

Limiting function: —

Category 6 limit:

The Transfer Impedance complies with the specified Category 6 limit, both before and after ageing, in the complete frequency range from 1 MHz to 100 MHz.

3P Project No. 1041025