

Laboratório de Ensaios

RELATÓRIO DE ENSAIO 10045-V01-01-R01

CABO UTP CAT. 6 – 4PARES – CONDUTOR MULTIFILAR – PAR TRANÇADO DE 100 OHMS

HISTÓRICO DAS REVISÕES

Revisão	Motivo	Período	Autor	Data
01	Emissão Inicial	03/05/10 a 05/05/10	jpgongora	05/05/10

APROVAÇÃO

**FITec – Responsável
Técnico**

Gabriel Quinteiro



Data

06/05/10

Autor(es)

José Henrique D. Gongora



Data

05/05/10

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1. OBJETIVO

Apresentar os resultados dos ensaios, realizados no Cabo UTP – sem blindagem – CAT.6 – para uso interno – par trançado de 100 ohms (capacidade de 4pares) - Multifilar, de fabricação Microcenter Teleinformática Comércio e Representações. Ltda, segundo os Documentos Normativos ANSI TIA/EIA-568-B.2-1-2002 (Commercial Building Telecommunications Cabling Standard – Part 2: Balanced Twisted-Pair Cabling Components – Addendum 1 – Transmission Performance Specifications for 4-pair 100Ω Category 6 Cabling).

2. INFORMAÇÕES GERAIS

2.1. Dados do Fabricante

2.2. Dados do Fabricante

Nome do Fabricante: Microcenter Teleinformática Comercio e Representações Ltda
Endereço: Av. Anapólis, 490 – Bethaville – Barueri – S.P.
CEP: 06404-250
Contato: Eduardo Corigliano
Telefone: +55 11 5606.8000

2.3. Dados do Solicitante

Nome do Solicitante: UL do Brasil Certificações.
Endereço: Rua Fidêncio Ramos, 195 – 2º andar – Vila Olímpia - São Paulo – S.P
CEP: 04551.010
Contato: João Abel
Telefone: +55 11 3049-8791

2.4. Dados do OCD

Nome do OCD: UL do Brasil Certificações
Endereço: Rua Fidêncio Ramos, 195 – 2º andar – Vila Olímpia - São Paulo – S.P
CEP: 04551.010
Contato: João Abel
Telefone: +55 11 3049-8791

2.5. Local dos Testes

Nome do Laboratório: Laboratório de Ensaios de Certificação - FITLAB
Fundação para Inovações Tecnológicas - FITec
Contato: Giuliano José Vanti Sancho
Telefone: +55 19 2137-6936

2.6. Dados Comerciais

Número do Contrato: 10053-01

3. DADOS DA AMOSTRA

3.1. Descrição

Cabo UTP – sem blindagem – cat. 6 – para uso interno – par trançado de 100 ohms (capacidade de 4 pares) – Condutor Multifilar – CM

3.2. Identificação

Tabela 1 – Identificação das Amostras

Informações das Amostras	Amostra 1
Código da Amostra	AMO-10045-V01
Modelo	Maxi CAT.6 UTP 24 AWGx4P PATCH TYPE CM
Número de Série	Não se aplica
Versão SW	Não se aplica
Data do Recebimento	28/04/2010
Outras Informações	Gravação no cabo: Vide item 3.3.

3.3. Fotos



Foto 1: 10045-V01-01-R01_MICROCENTER_UTP_CAT6_GRAVAÇÃO

4. CONDIÇÕES AMBIENTAIS

Tabela 2 – Temperatura (°C)

Temperatura Mínima	21,8
Temperatura Máxima	22,2

5. INSTRUMENTOS UTILIZADOS

Tabela 3 – Instrumentos Utilizados

Nome do Instrumento	Nº de série	Validade da Calibração
Network Analyzer E0562A	MY44100267	02/12
Mini data logger 175-H2	20026553/402	06/10

6. SW UTILIZADOS

Tabela 4 – Produtos/Ferramentas SW Utilizados

Código do Item SW	Nome do SW	Versão	Fornecedor
SW01	A1 – LAN	V1.0 R23.01.2006	Josaphat Engenharia
SW02	A1 – LCL	2.0	Josaphat Engenharia

7. ENSAIOS REALIZADOS

Tabela 5 – Ensaios Realizados

Documento Normativo: ANSI TIA/EIA-568-B.2-1-2002 (Commercial Building Telecommunications Cabling Standard – Part 2: Balanced Twisted-Pair Cabling Components – Addendum 1 – Transmission Performance Specifications for 4-pair 100Ω Category 6								
Instrução de Testes: ITT-06001-03-CABOS_LAN-UTP-STP-CAT-3-5e-6								
Item da Norma	Ensaio	Método	Requisito	Resultado Obtido				
7.2 e 7.2.1.1	NEXT	ASTM D4566	Para todas as frequências de 0,772MHz à 250MHz, a perda NEXT (Near-end crosstalk “NEXT” loss), para um comprimento de 100m ou maior, deve satisfazer os valores determinados utilizando a equação “13” do documento normativo TIA/EIA-568-B.2-1.	Pior caso				
				Sentido da gravação	Par	Freq. (MHz)	Especificado (dB)	NEXT (dB)
				Crescente	1x3	250,0	38,3	42,2
				Decrescente	1x3	97,3	44,5	48,3
7.2.2 e 7.2.2.1	PSNEXT	ASTM D4566	Para todas as frequências de 0,772MHz à 250MHz, a perda PSNEXT (power sum near-end crosstalk “PSNEXT” loss), para um comprimento de 100m ou maior, deve satisfazer os valores determinados utilizando a equação “23” do documento normativo TIA/EIA-568-B.2-1	Pior caso				
				Sentido da gravação	Par	Freq. (MHz)	Especificado (dB)	PSNEXT (dB)
				Crescente	1	250,0	36,3	40,2
				Decrescente	3	149,7	39,7	44,4

Este documento contém informações proprietárias da Microcenter Teleinformática Com. e Represent. Ltda que não podem ser usadas, divulgadas ou reproduzidas sem autorização legal. Os resultados apresentados referem-se exclusivamente às amostras ensaiadas nas condições relatadas.

Item da Norma	Ensaio	Método	Requisito	Resultado Obtido				
7.4 e 7.4..2	Perda de retorno	ASTM D4566	Para todas as frequências de 1MHz à 250MHz, a perda de retorno (return loss), para um comprimento de 100m, deve satisfazer os valores determinados utilizando as equações especificadas na tabela “23” do documento normativo TIA/EIA-568-B.2-1.	Pior caso				
				Sentido da gravação	Par	Freq. (MHz)	Especificado (dB)	Perda de Retorno (dB)
				Crescente	3	1,3	20,6	21,4
				Decrescente	4	189,3	16,6	16,8
7.5 e 7.5.1	Atraso de propagação	ASTM D4566	Para todas as frequências de 1MHz à 250MHz, o atraso de propagação (propagation delay) deve satisfazer os valores determinados utilizando a equação “34” do documento normativo TIA/EIA-568-B.2-1.	Pior caso				
				Par	Frequência (MHz)	Especificado (ns/100m)	Atraso de propagação (ns/100m)	
				1	248,6	536,3	507,6	
7.6 e 7.6.1.1	Perda de Conversão Longitudinal	ASTM D4566	Para todas as frequências de 1MHz à 250MHz, LCL (longitudinal conversion loss) deve satisfazer os valores determinados utilizando a equação “35” do documento normativo TIA/EIA-568-B.2-1.	Pior caso				
				Sentido	Freq. (MHz)	Especificado (dB)	Perda de Conversão Longitudinal (dB)	
				Crescente da gravação	75,5	31,2	38,1	
Decrescente da gravação	79,1	31,0	37,8					

OBS.: A incerteza expandida relatada é baseada em uma incerteza padronizada combinada, multiplicada por um fator de abrangência k fornecendo um nível de confiança de aproximadamente 95%.

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7.1. Outras Informações

7.1.1. Foi utilizado para o ensaio um comprimento de 100 metros da amostra, que permaneceu climatizada 24 horas antes e durante o ensaio na temperatura de $20 \pm 3^{\circ}\text{C}$.

8. DOCUMENTOS ASSOCIADOS

8.1. Documentos de Referência

[1] ANSI TIA/EIA-568-B.2-1-2002 (Commercial Building Telecommunications Cabling Standard – Part 2: Balanced Twisted-Pair Cabling Components – Addendum 1 – Transmission Performance Specifications for 4-pair 100 Ω Category 6 Cabling);

9. LISTA DE COLABORADORES

Tabela 6 – Lista de colaboradores

Nome	Empresa	Fone	E-mail
José Henrique D. Gongora	Versus	+55 (19) 2137-6816	jgongora@fitec.org.br

10. ANEXOS

Relatórios emitidos pelo equipamento automático de teste SISTEMA A1.

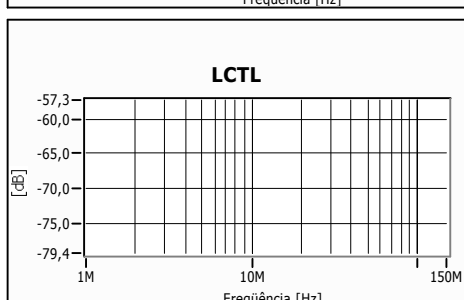
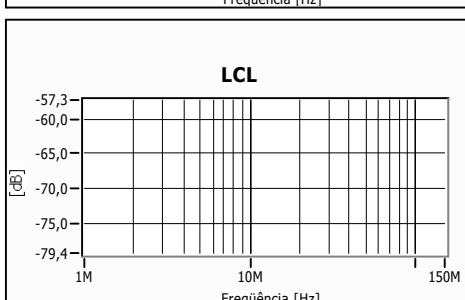
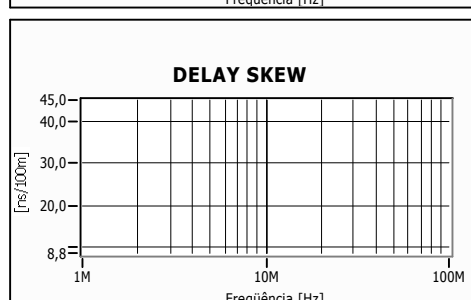
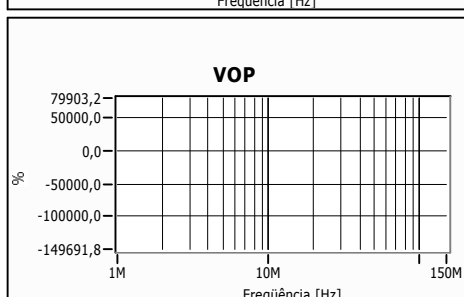
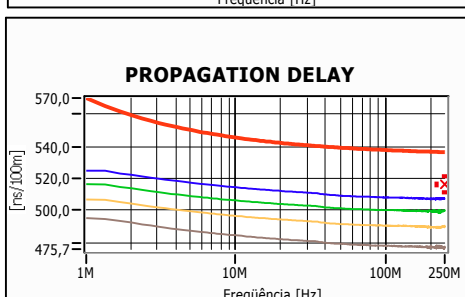
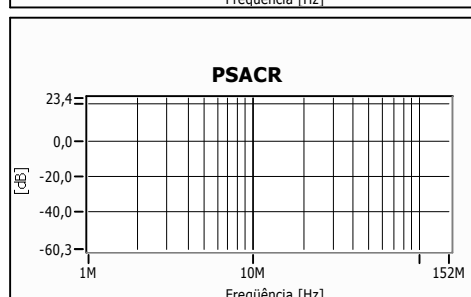
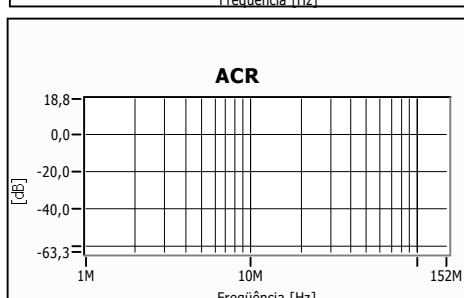
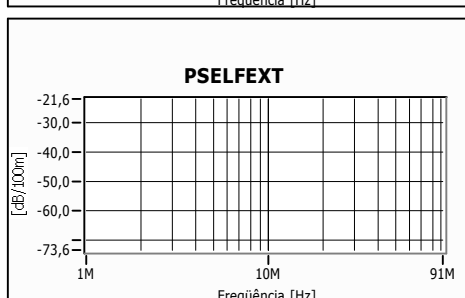
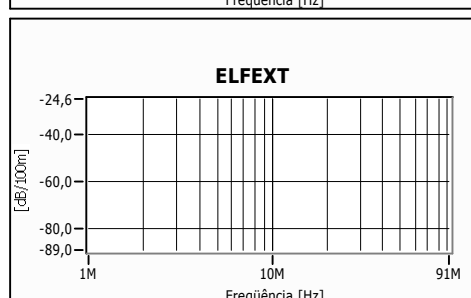
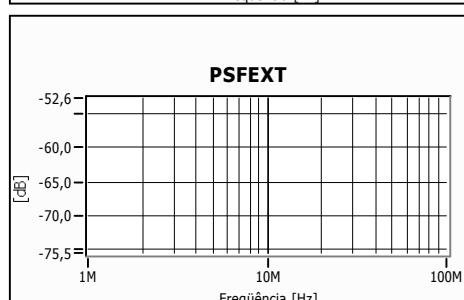
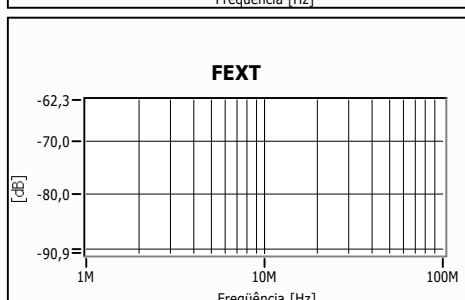
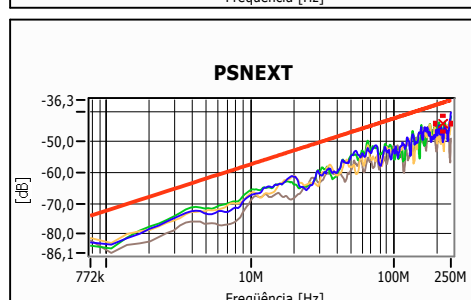
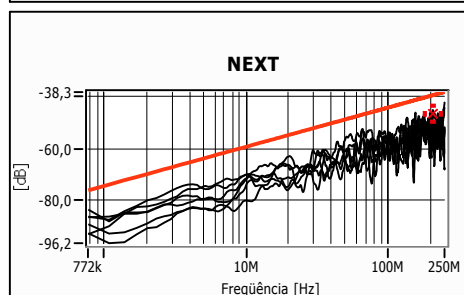
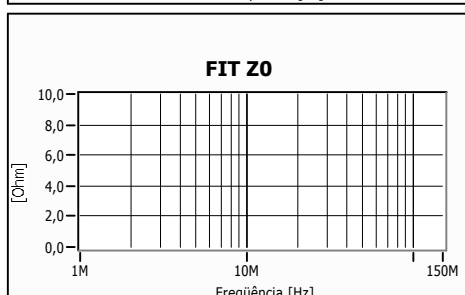
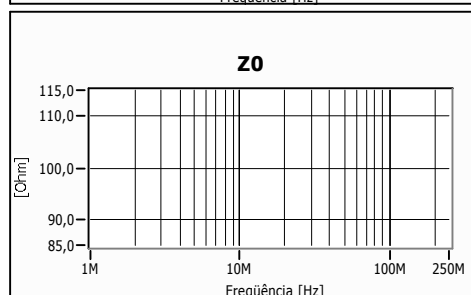
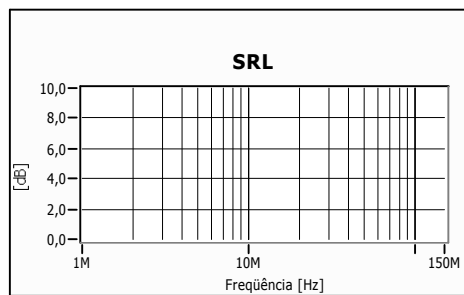
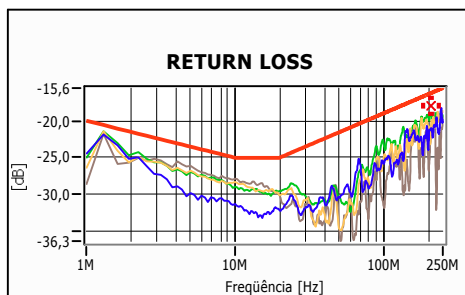
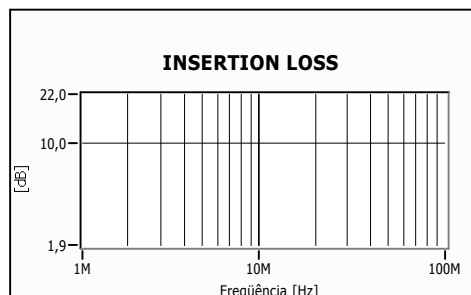
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[AMO-10045-V01][LCL].pdf

CABEÇALHO

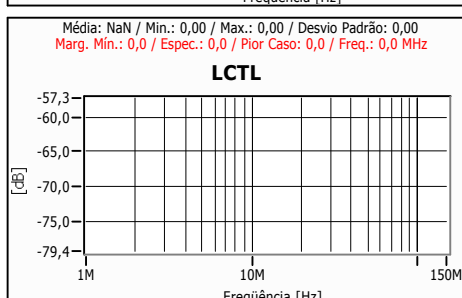
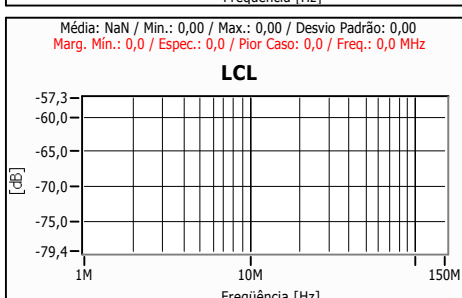
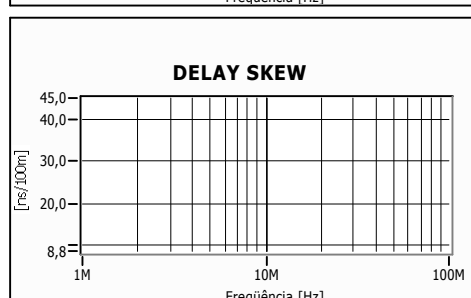
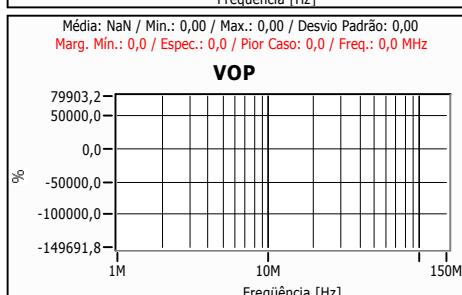
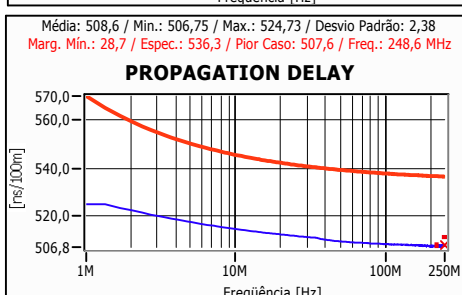
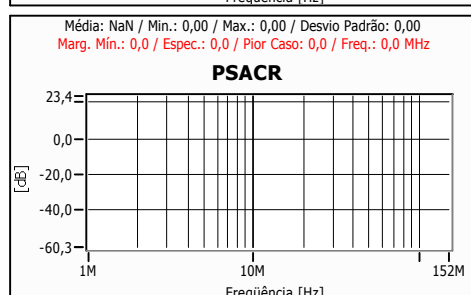
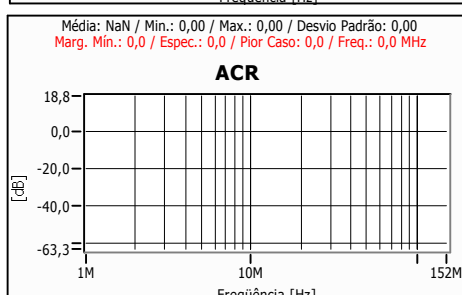
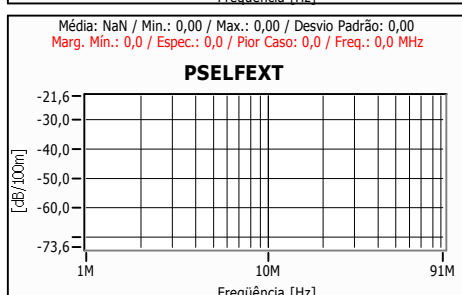
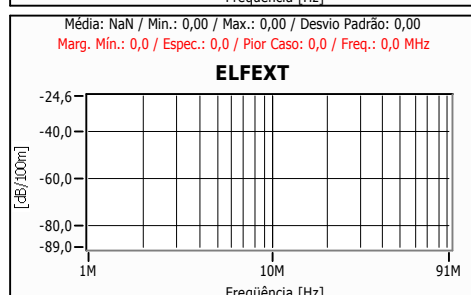
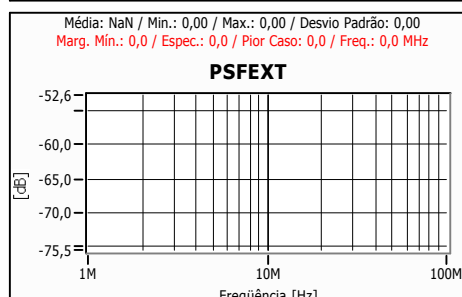
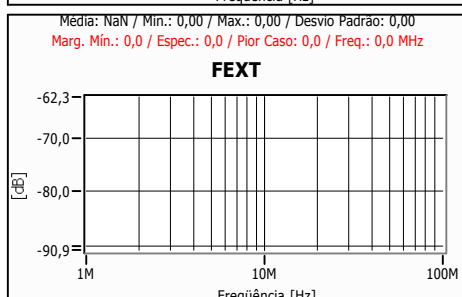
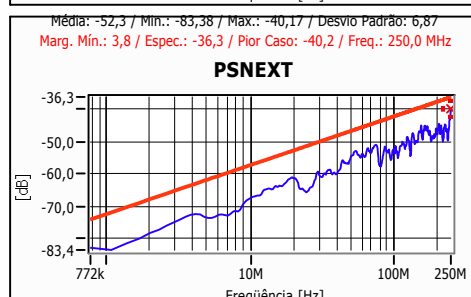
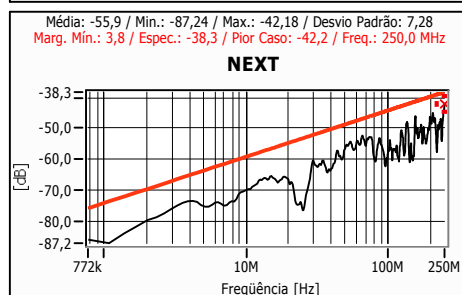
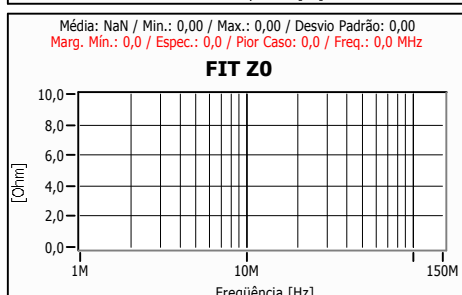
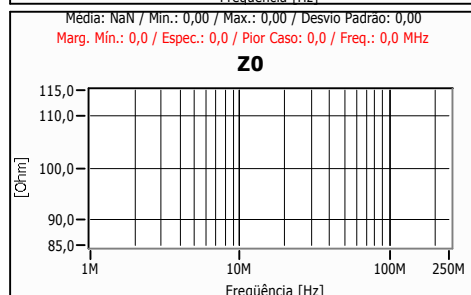
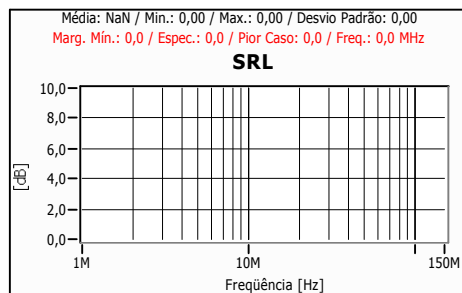
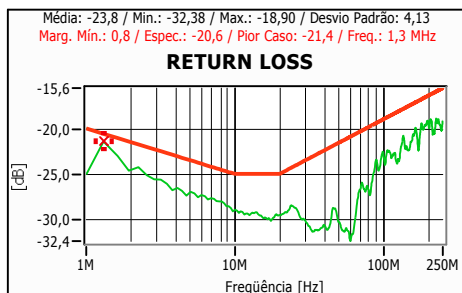
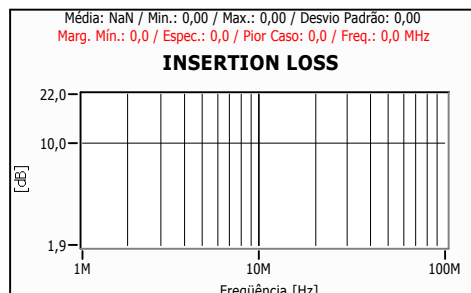
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Ensaio	20GRAUS_C	Temperatura	22°C
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Técnico	JGONGORA	Hora	11:36
		Observação	SENTIDO CRESCENTE GRAVACAO
Categoria	CAT6_FLEX	Certificação	SIM

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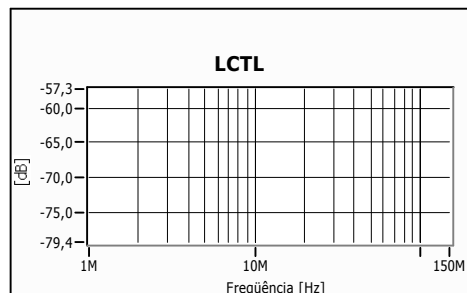
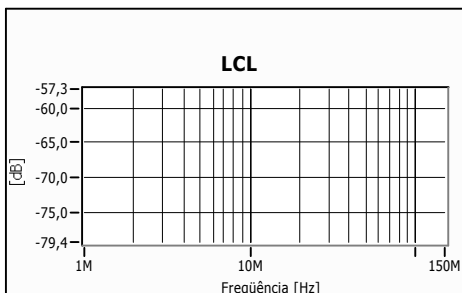
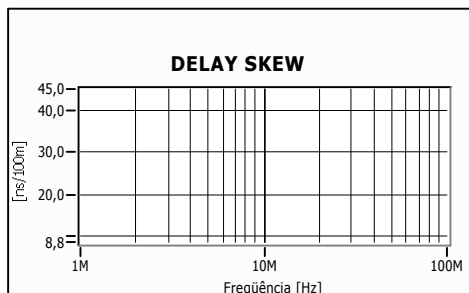
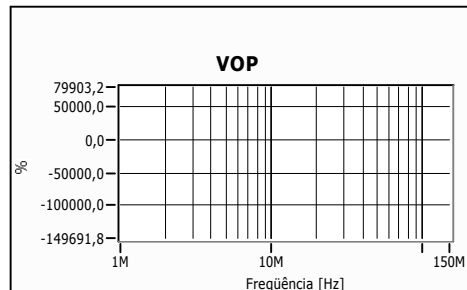
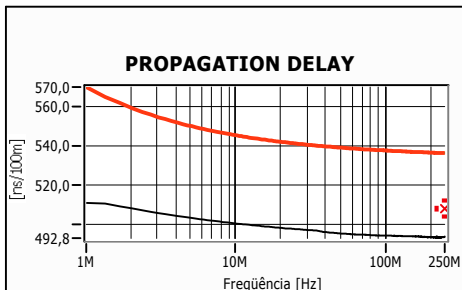
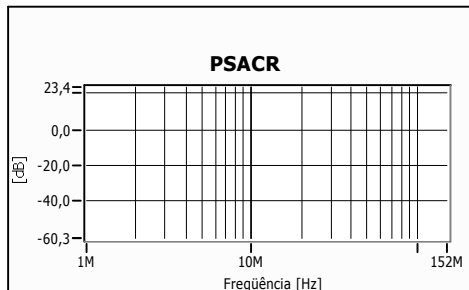
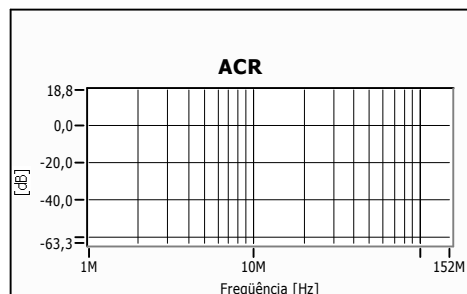
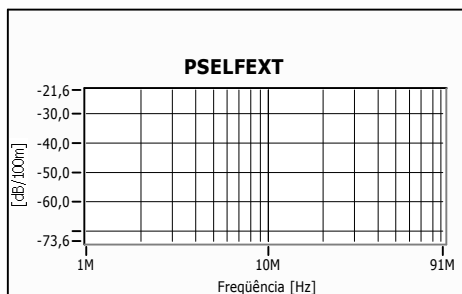
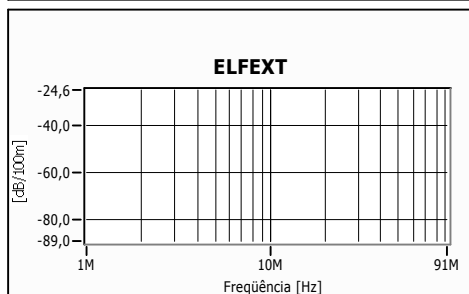
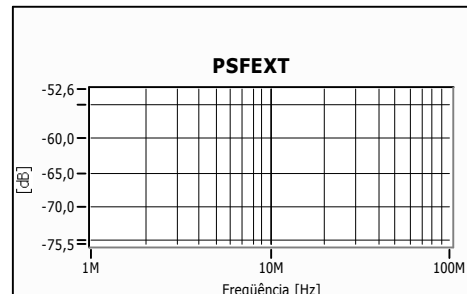
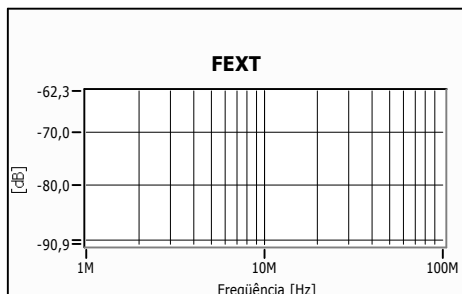
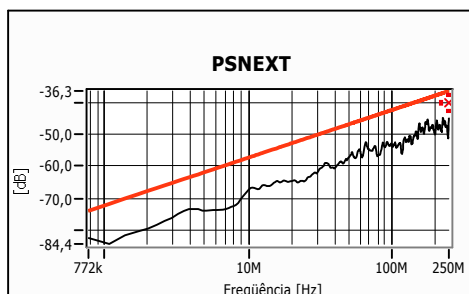
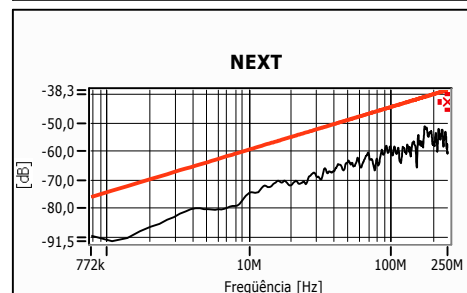
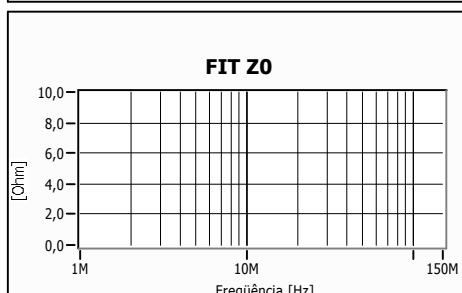
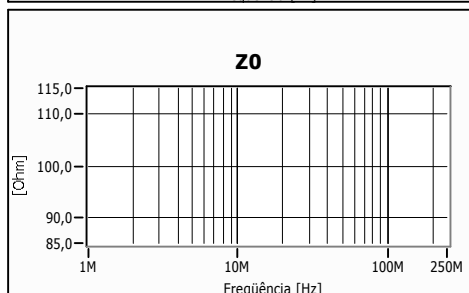
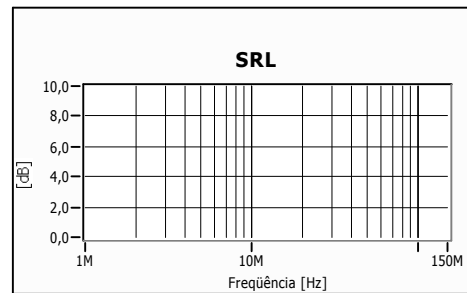
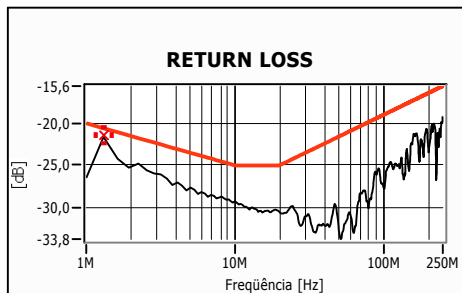
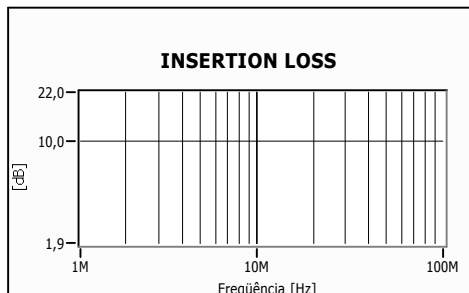
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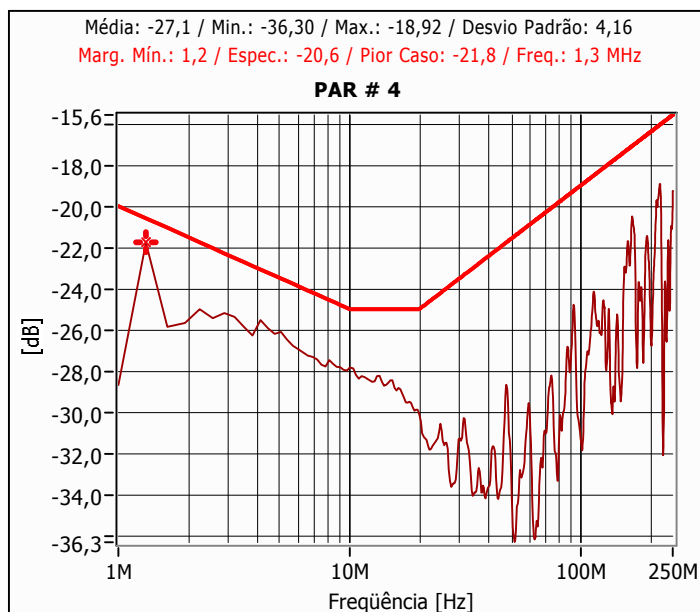
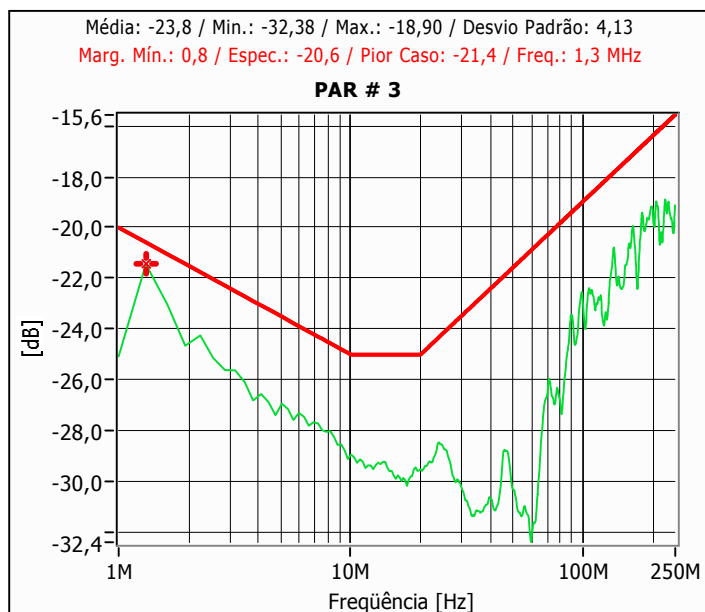
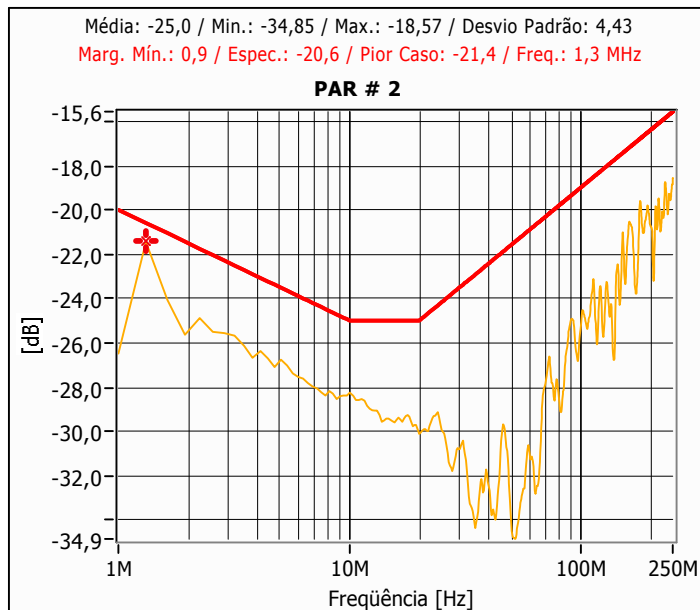
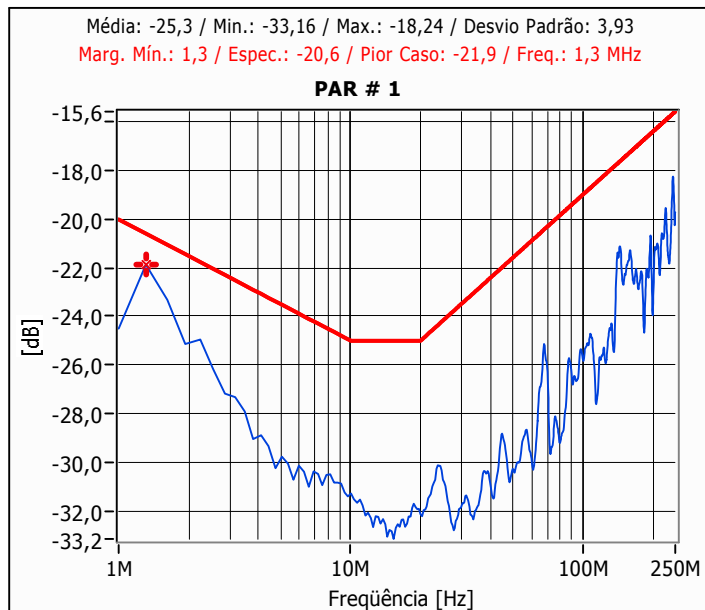
PIOR CASO



MÉDIAS

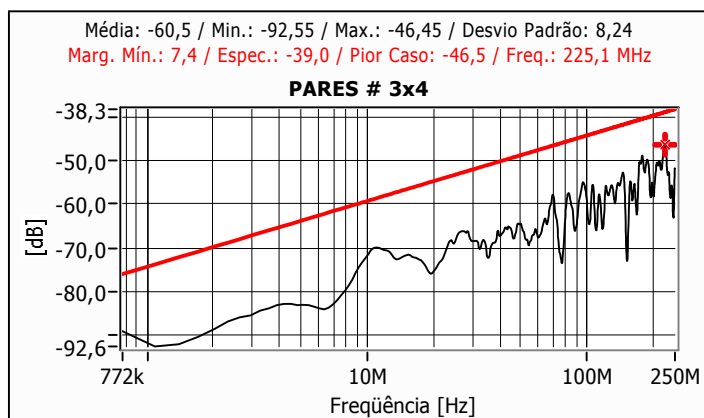
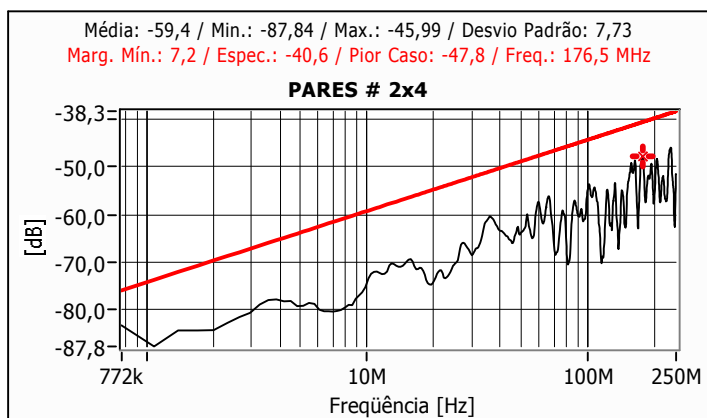
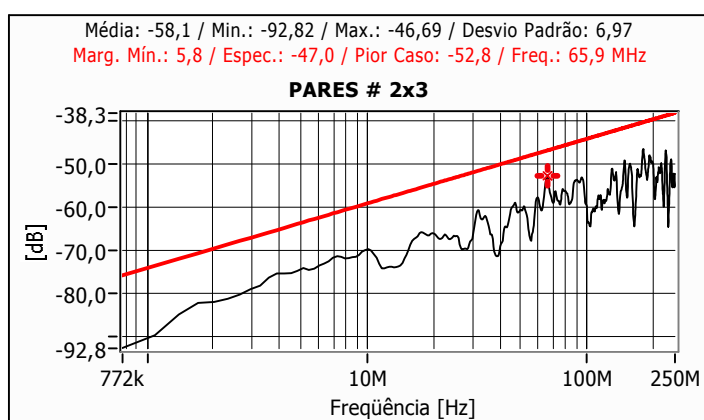
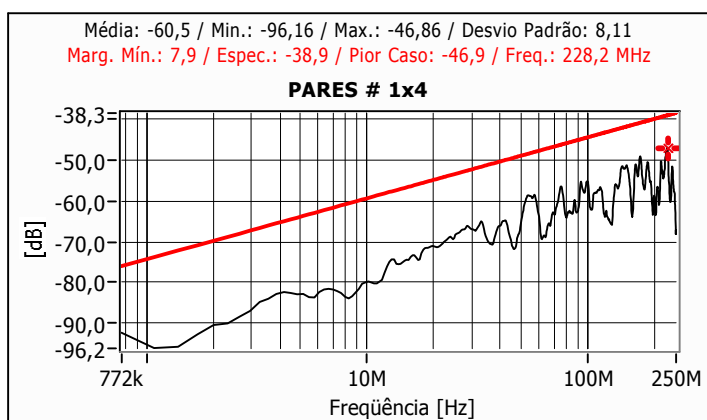
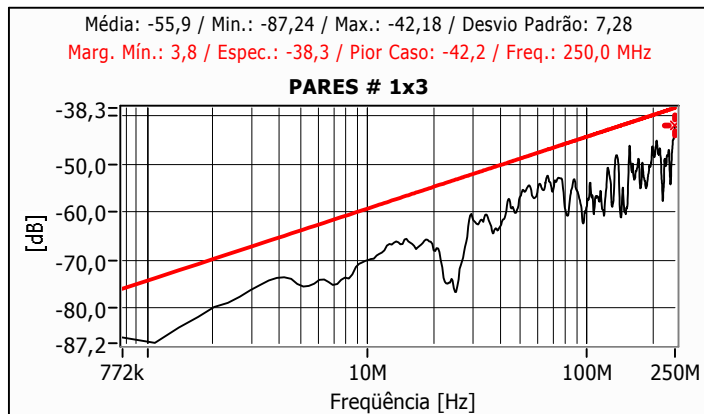
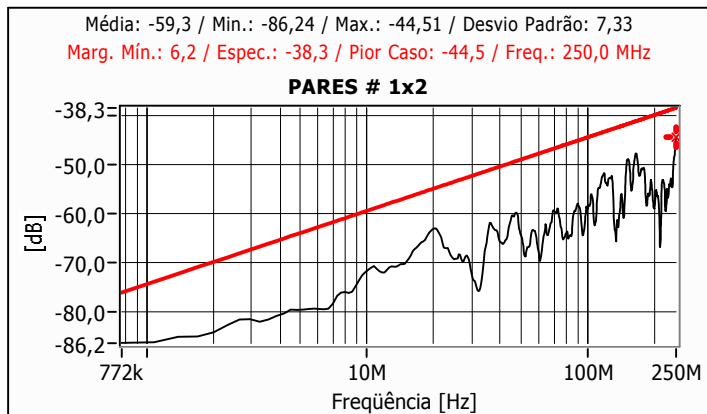


RETURN LOSS



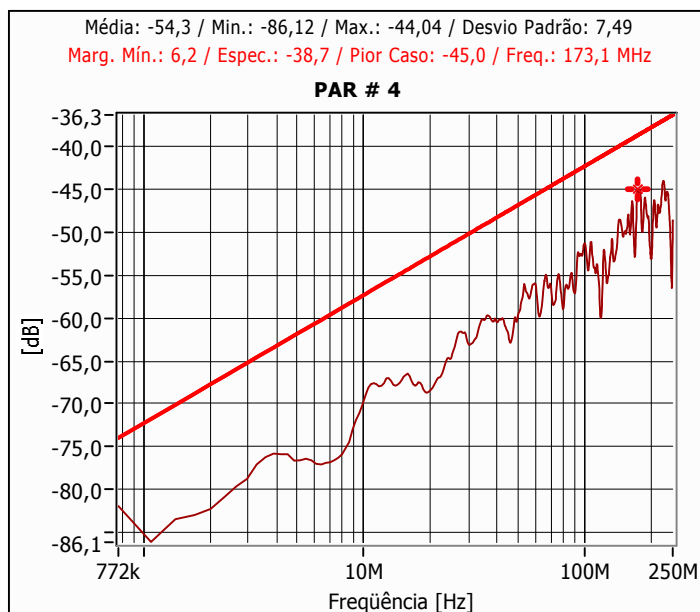
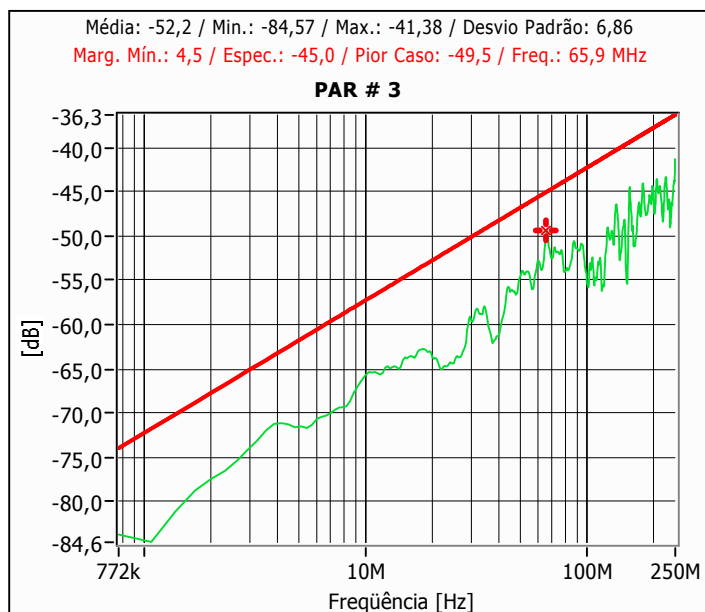
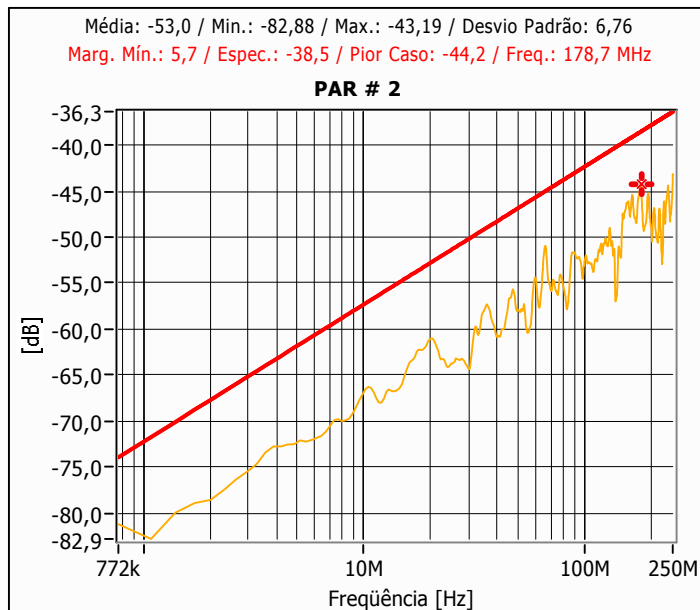
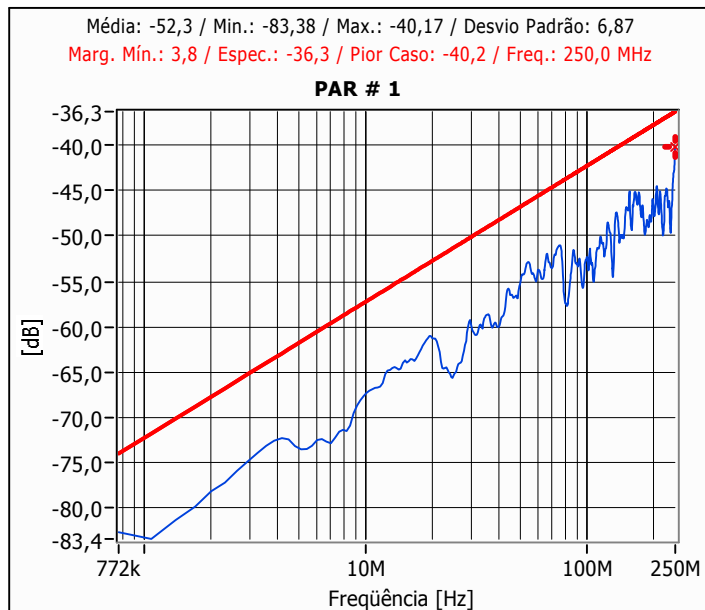
FREQ.	1	2	3	4	MIN.	MAX.	MÉDIA
1,00	24,50	26,48	25,07	28,68	24,50	28,68	26,50
4,00	28,89	26,38	26,56	25,53	25,53	28,89	27,03
8,00	30,52	28,37	28,04	27,78	27,78	30,52	28,82
10,00	31,29	28,26	28,93	27,84	27,84	31,29	29,30
16,00	32,57	29,48	29,76	28,95	28,95	32,57	30,44
20,00	32,15	30,12	29,52	30,09	29,52	32,15	30,59
25,00	30,72	29,93	28,60	30,88	28,60	30,88	30,12
31,25	31,40	30,69	30,74	30,29	30,29	31,40	30,80
62,50	29,48	31,91	31,53	36,02	29,48	36,02	32,93
100,00	25,75	25,25	22,88	31,38	22,88	31,38	27,56
200,00	23,90	20,71	19,28	25,35	19,28	25,35	22,96
250,00	19,72	18,57	19,13	19,27	18,57	19,72	19,19

NEXT



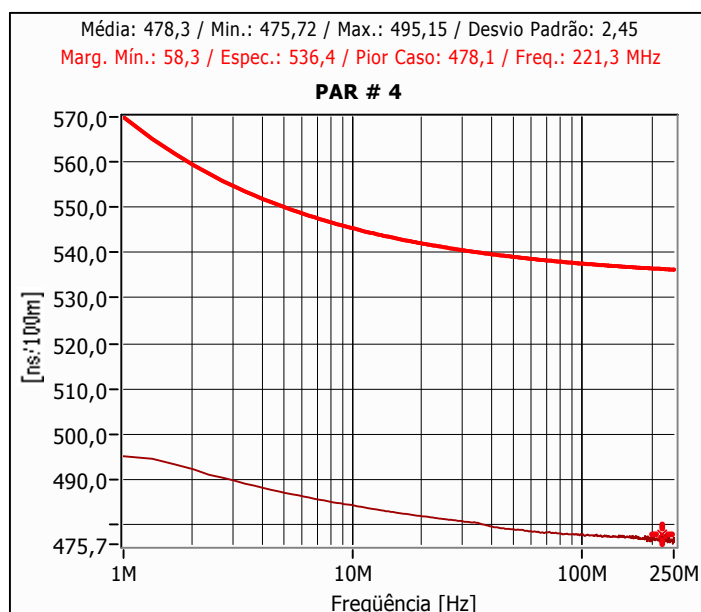
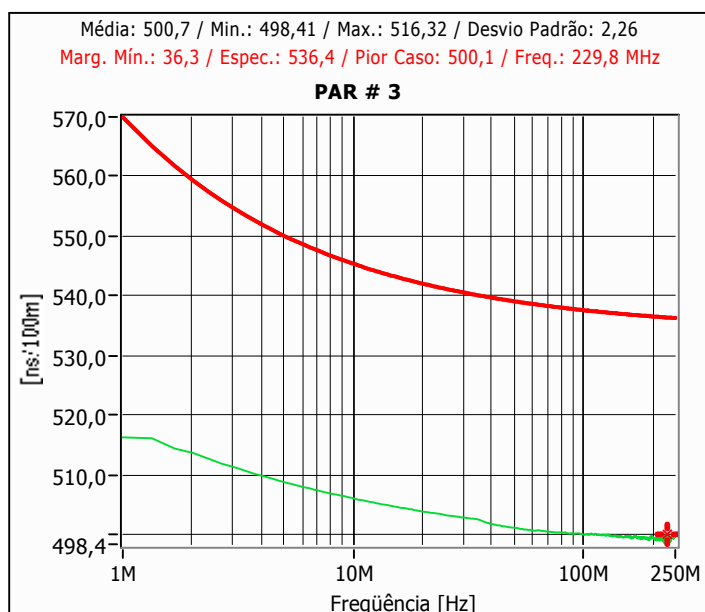
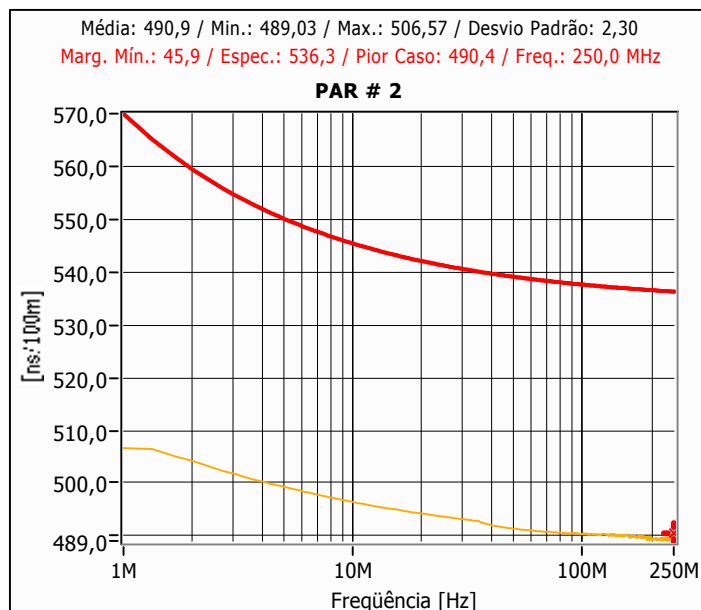
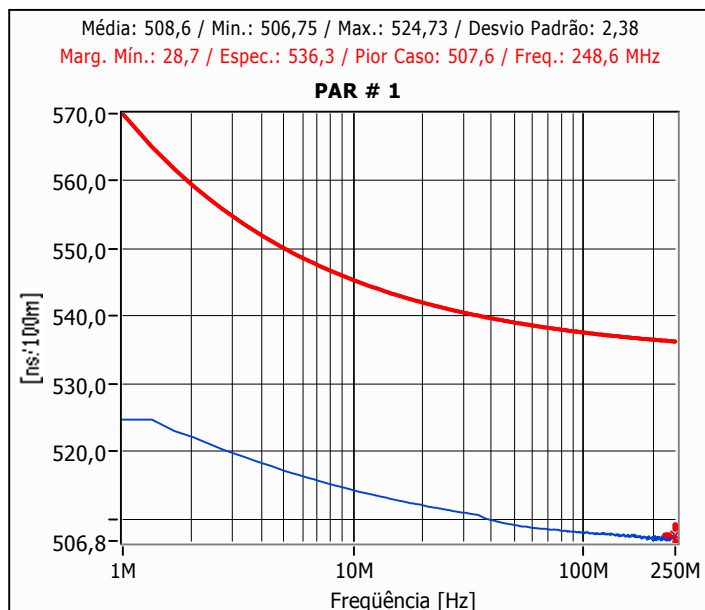
FREQ.	1x2	1x3	1x4	2x3	2x4	3x4	MIN.	MAX.	MÉDIA
0,77	86,24	86,09	92,36	92,82	83,38	89,02	83,38	92,82	89,61
1,00	86,09	87,24	96,16	89,80	87,84	92,55	86,09	96,16	91,48
4,00	80,77	73,75	82,88	75,54	77,94	83,07	73,75	83,07	80,27
8,00	75,90	73,64	83,57	72,07	79,64	79,74	72,07	83,57	79,14
10,00	71,29	69,96	79,81	69,88	73,49	71,51	69,88	79,81	74,40
16,00	67,58	66,61	73,30	68,00	69,96	72,00	66,61	73,30	70,26
20,00	62,95	67,99	71,13	66,25	74,05	75,28	62,95	75,28	71,49
25,00	69,09	76,61	68,28	66,87	70,33	68,63	66,87	76,61	71,44
31,25	74,80	62,35	66,99	62,00	67,17	68,41	62,00	74,80	69,26
62,50	65,68	55,29	68,84	60,65	61,97	65,49	55,29	68,84	64,76
100,00	58,43	57,79	55,65	62,93	54,15	61,43	54,15	62,93	59,44
200,00	58,66	47,89	60,51	51,36	55,97	58,23	47,89	60,51	57,15
250,00	44,51	42,18	67,21	52,44	51,62	51,85	42,18	67,21	59,83

PSNEXT



FREQ.	1	2	3	4	MIN.	MAX.	MÉDIA
0,77	82,66	81,26	83,73	81,92	81,26	83,73	82,49
1,00	83,38	82,88	84,57	86,12	82,88	86,12	84,42
4,00	72,54	72,81	71,25	75,82	71,25	75,82	73,45
8,00	71,35	70,06	69,36	75,87	69,36	75,87	72,49
10,00	67,32	66,54	65,62	69,00	65,62	69,00	67,30
16,00	63,57	63,63	63,56	66,76	63,56	66,76	64,62
20,00	61,29	61,06	63,71	68,35	61,06	68,35	64,70
25,00	65,32	63,75	64,39	64,23	63,75	65,32	64,46
31,25	60,89	60,67	58,67	62,71	58,67	62,71	60,97
62,50	54,74	57,53	53,87	59,79	53,87	59,79	57,12
100,00	52,35	52,37	55,39	51,37	51,37	55,39	53,16
200,00	47,32	49,51	46,01	53,08	46,01	53,08	49,85
250,00	40,17	43,19	41,38	48,66	40,17	48,66	44,72

PROPAGATION DELAY



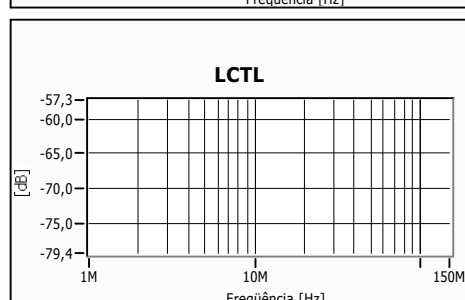
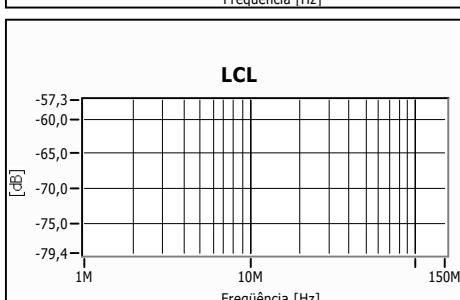
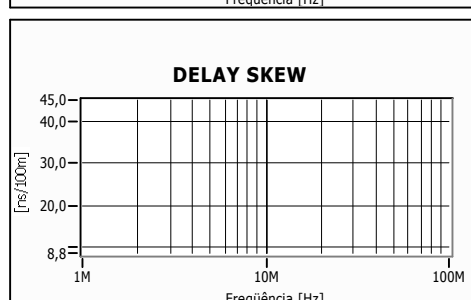
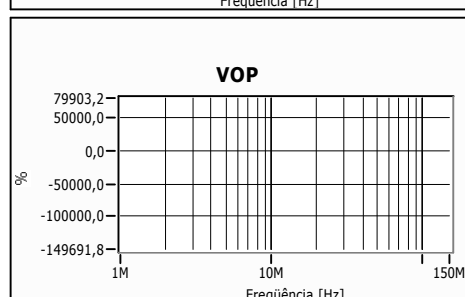
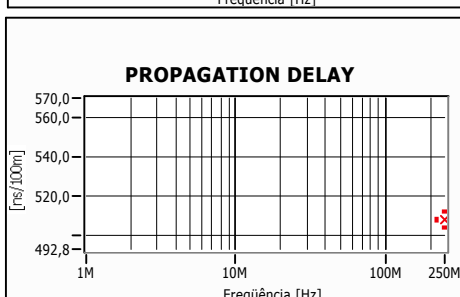
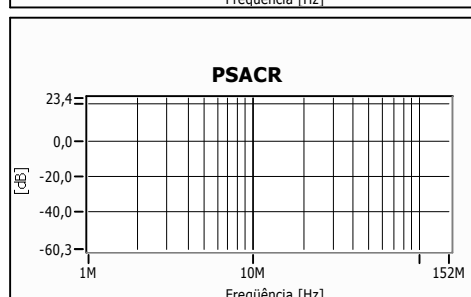
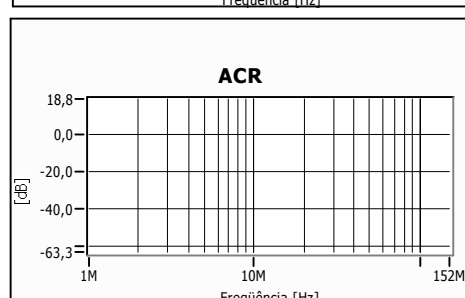
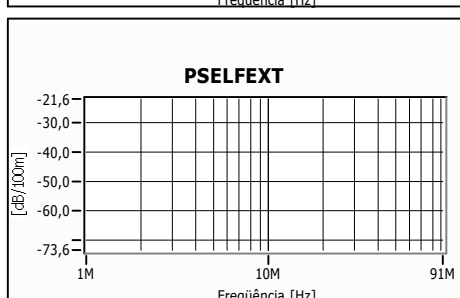
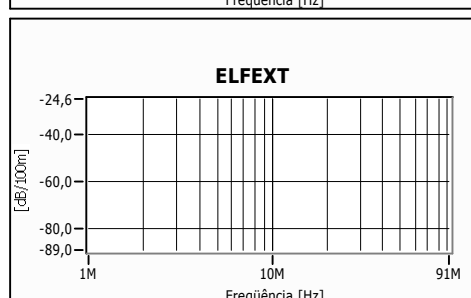
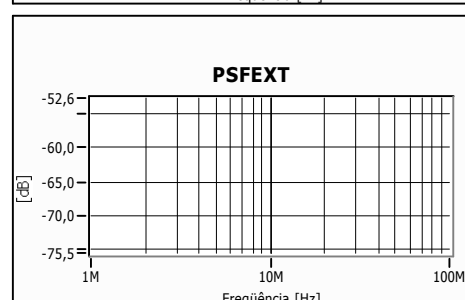
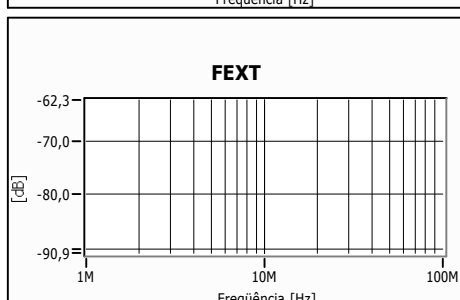
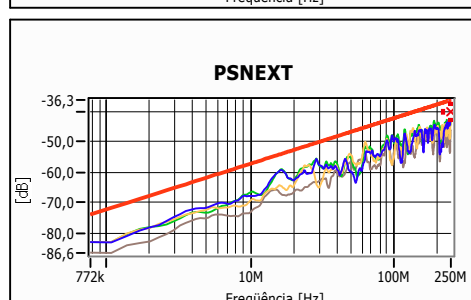
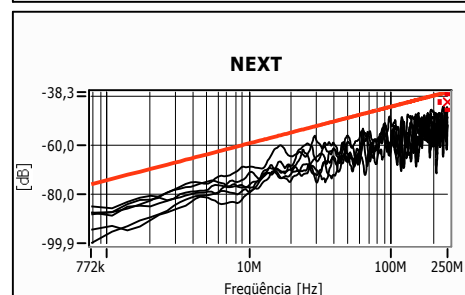
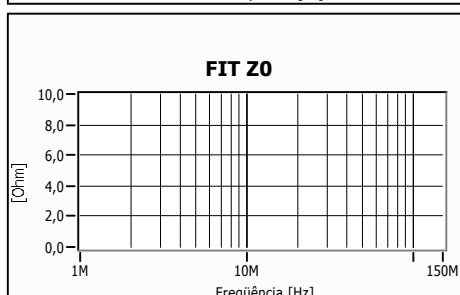
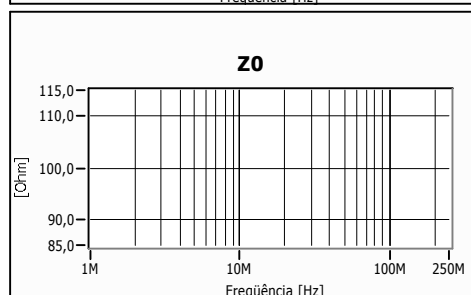
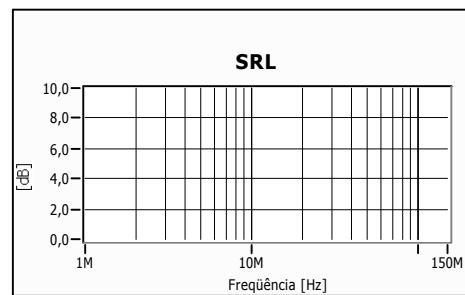
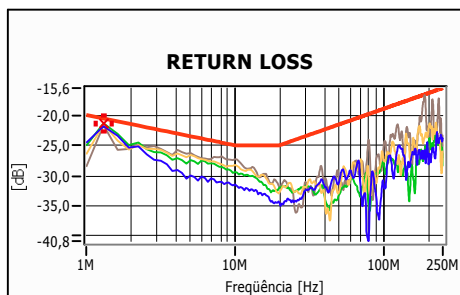
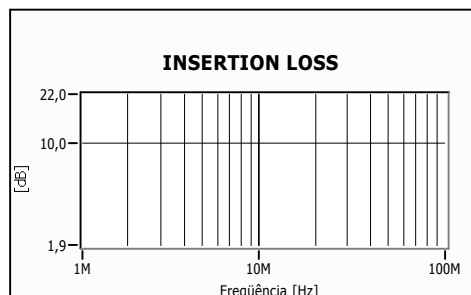
FREQ.	1	2	3	4	MIN.	MAX.	MÉDIA
1,00	524,73	506,57	516,32	495,15	495,15	516,32	510,69
4,00	518,20	500,23	509,79	488,14	488,14	509,79	504,09
8,00	515,06	497,17	506,81	484,94	484,94	506,81	501,00
10,00	514,35	496,45	506,12	484,33	484,33	506,12	500,31
16,00	512,68	494,87	504,53	482,53	482,53	504,53	498,65
20,00	512,02	494,19	503,86	481,87	481,87	503,86	497,99
25,00	511,44	493,63	503,30	481,26	481,26	503,30	497,41
31,25	510,85	493,06	502,78	480,62	480,62	502,78	496,83
62,50	508,65	490,90	500,68	478,50	478,50	500,68	494,68
100,00	508,02	490,29	500,06	477,79	477,79	500,06	494,04
200,00	507,34	489,44	499,50	477,20	477,20	499,50	493,37
250,00	507,16	490,39	499,65	476,21	476,21	499,65	493,35

CABEÇALHO

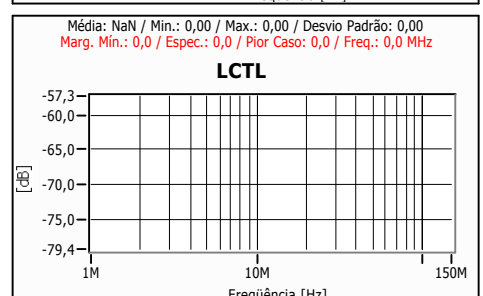
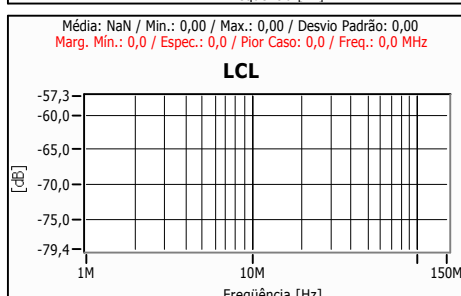
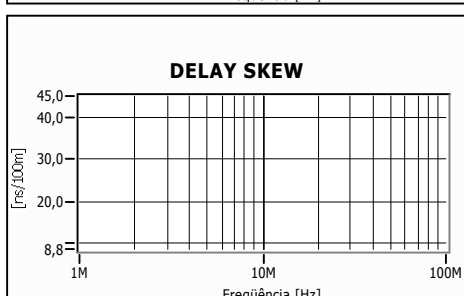
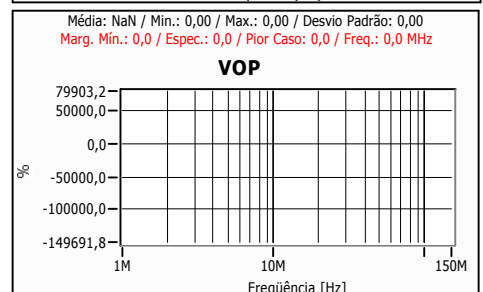
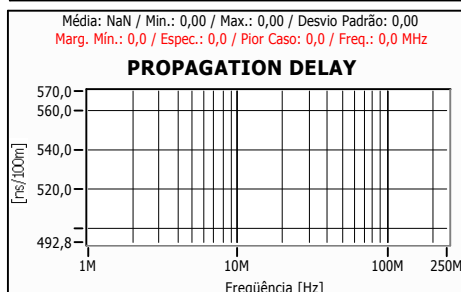
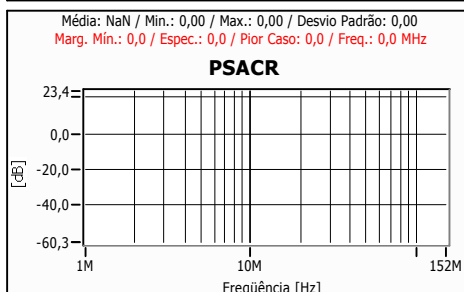
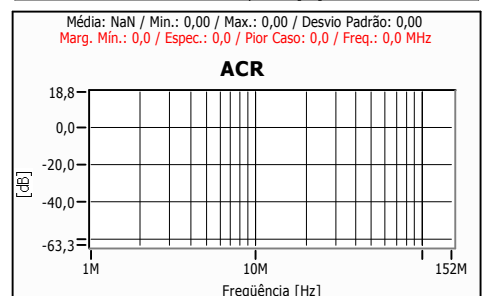
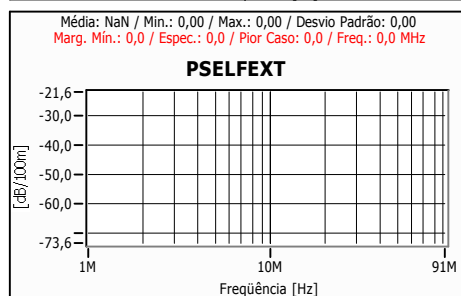
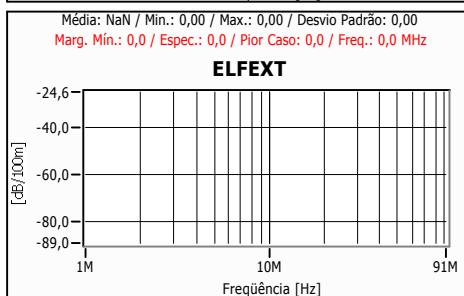
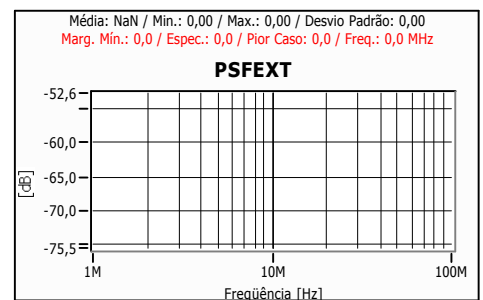
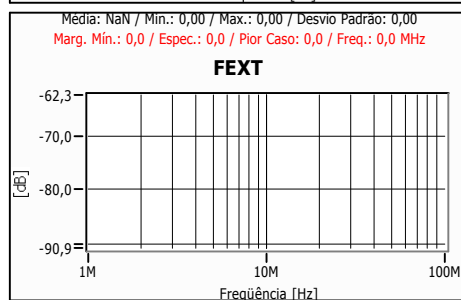
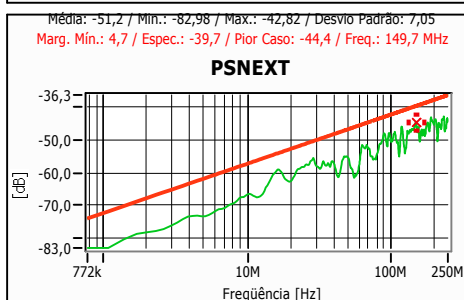
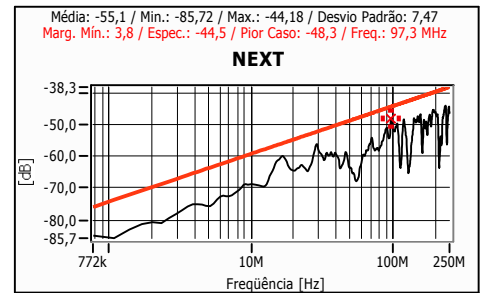
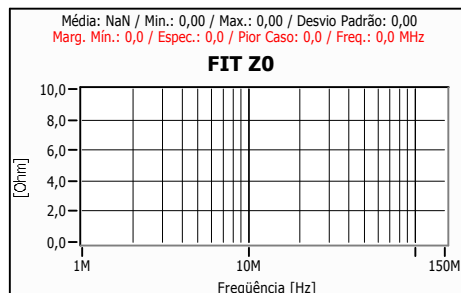
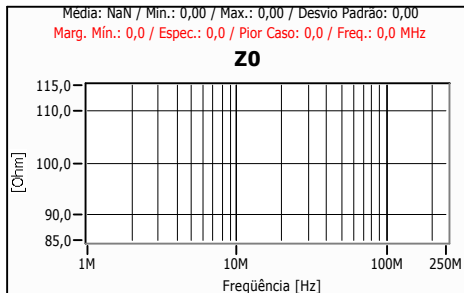
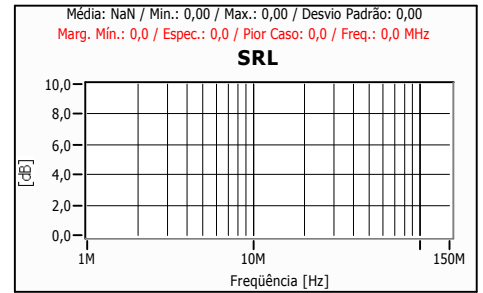
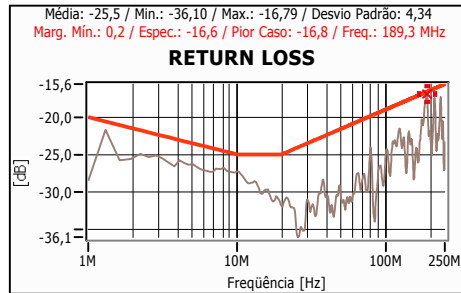
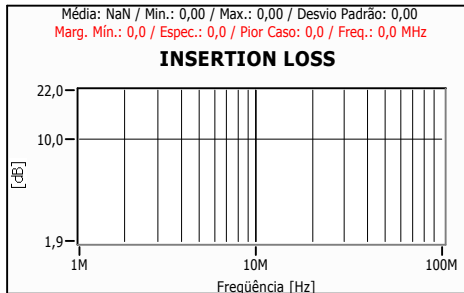
Código	AMO-10045-V01	Comprimento	100,0m
Ensaio	20GRAUS_D	Temperatura	22°C
Produto	Cabo Lan CAT6 4P Flexível	Data	03/05/2010
Técnico	JGONGORA	Hora	11:40
		Observação	SENTIDO DECRESCENTE GRAVACAO
Categoria	CAT6_FLEX	Certificação	SIM

[illegible]

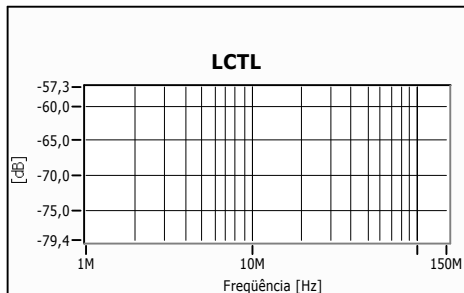
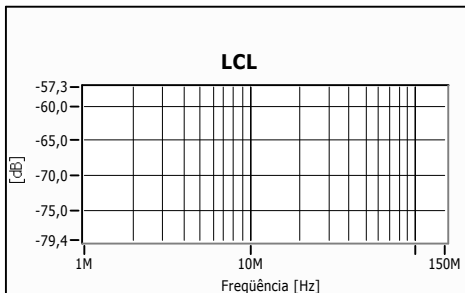
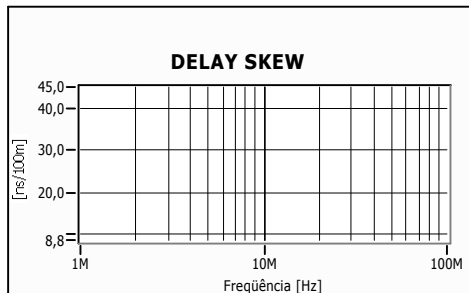
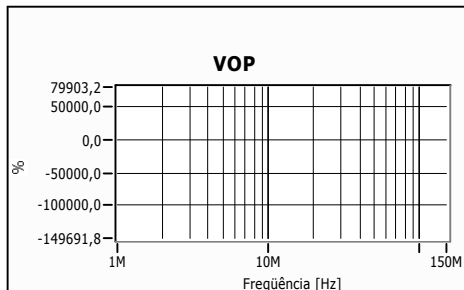
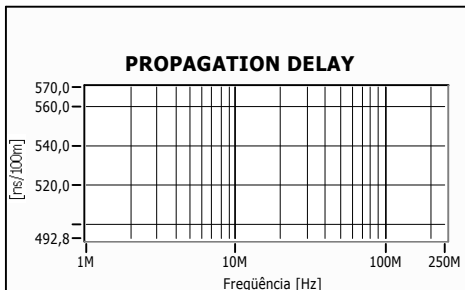
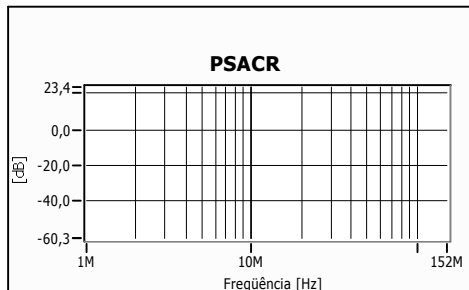
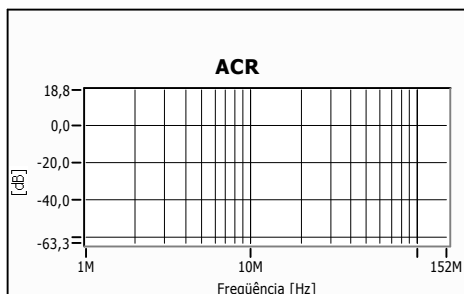
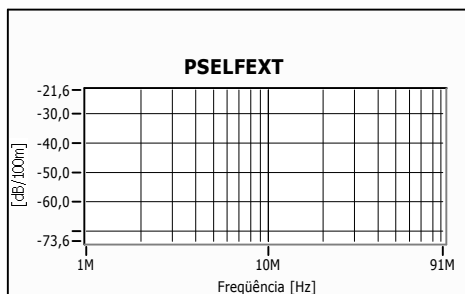
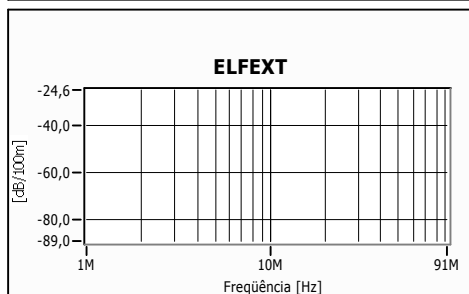
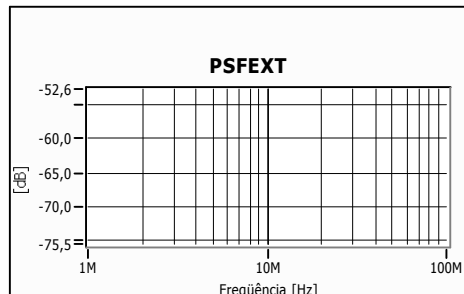
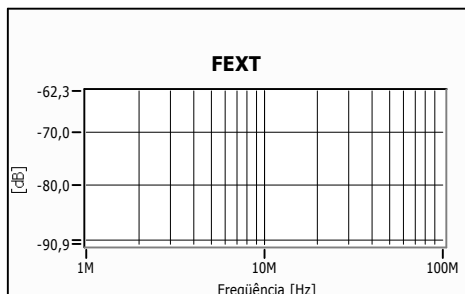
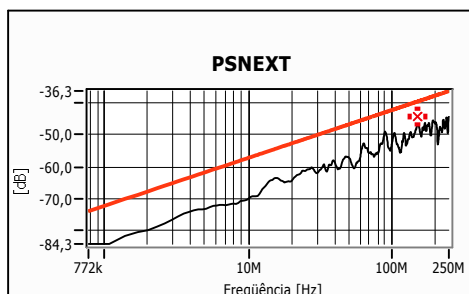
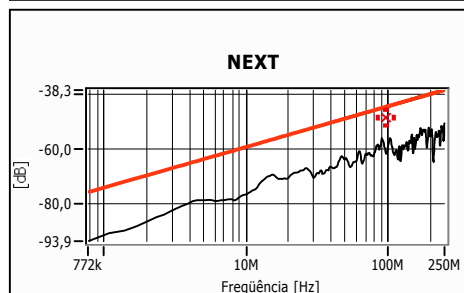
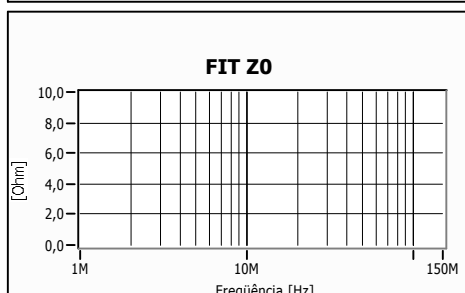
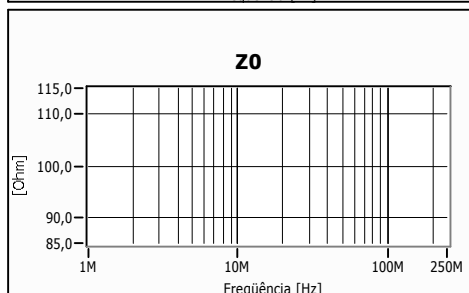
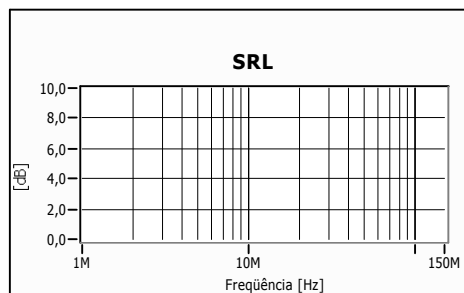
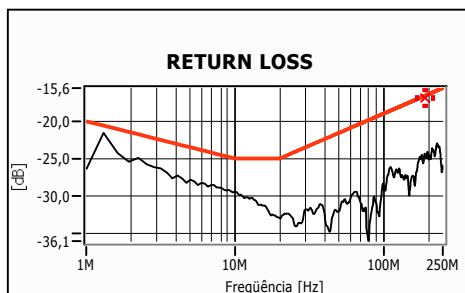
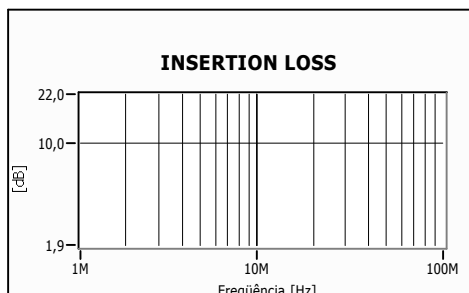
SUMÁRIO



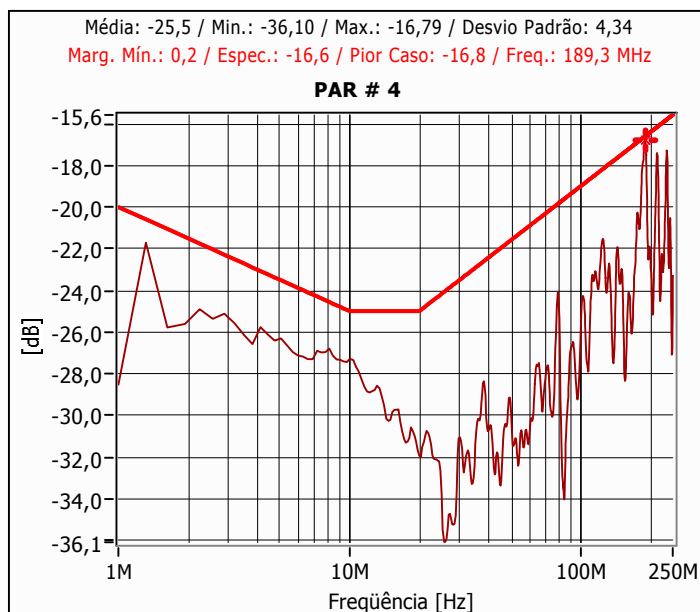
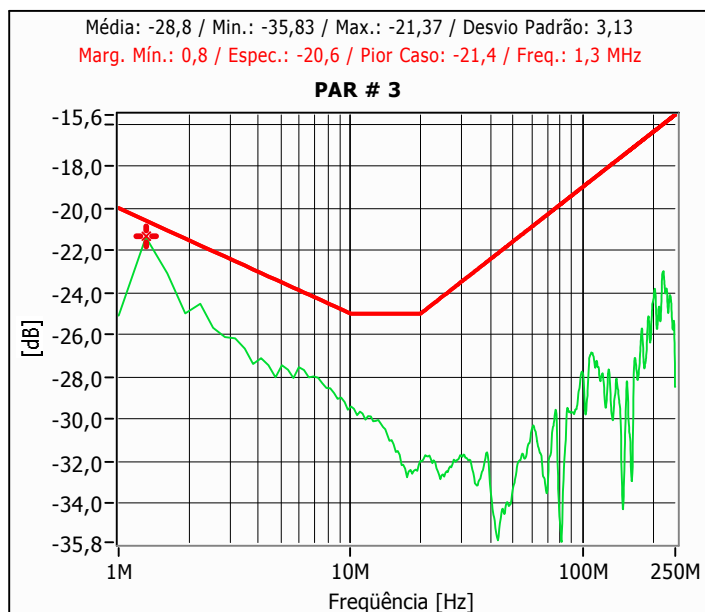
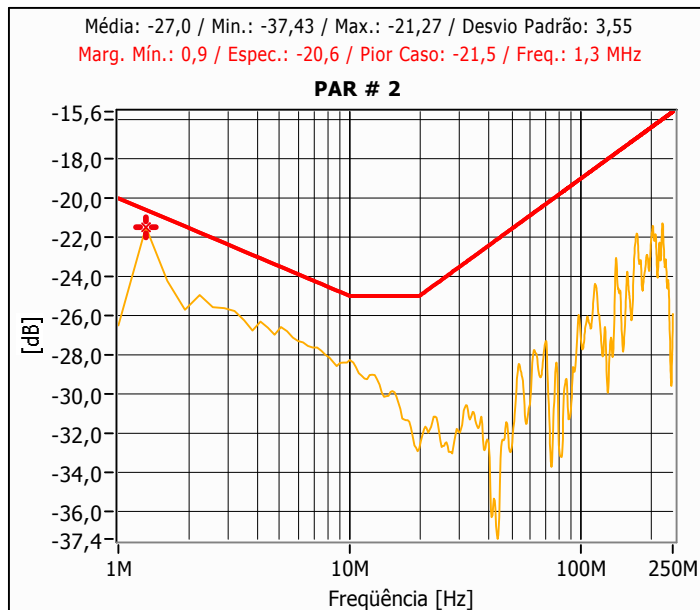
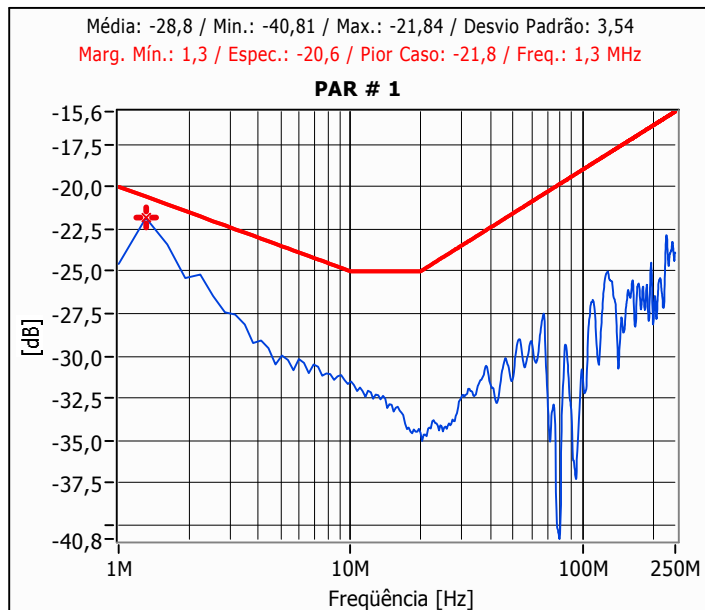
PIOR CASO



MÉDIAS

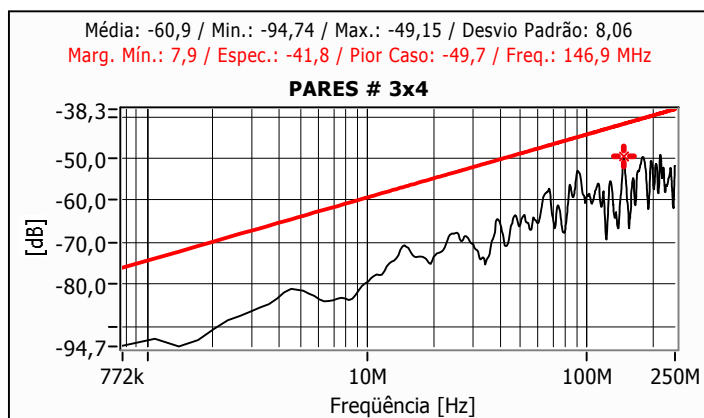
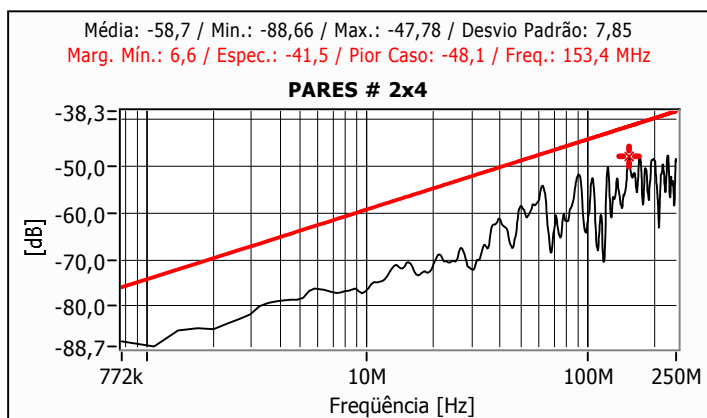
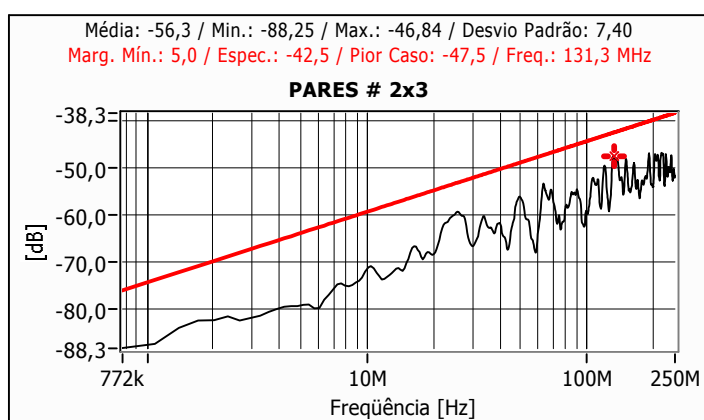
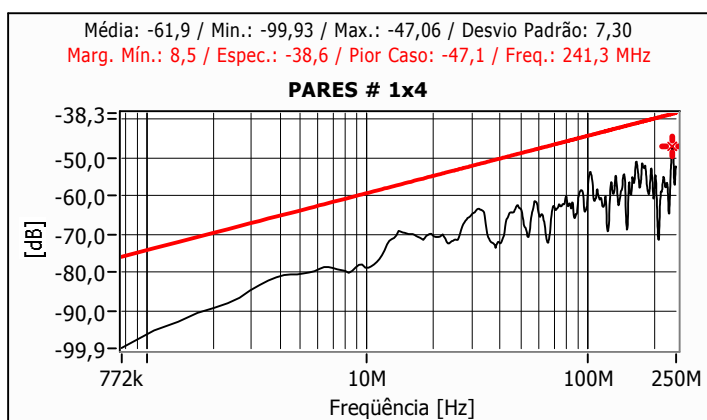
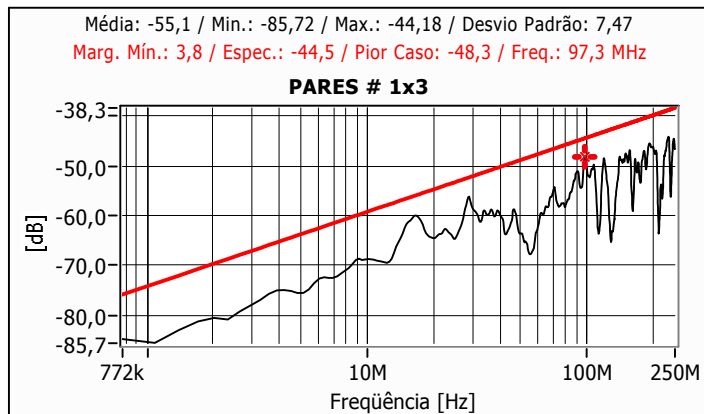
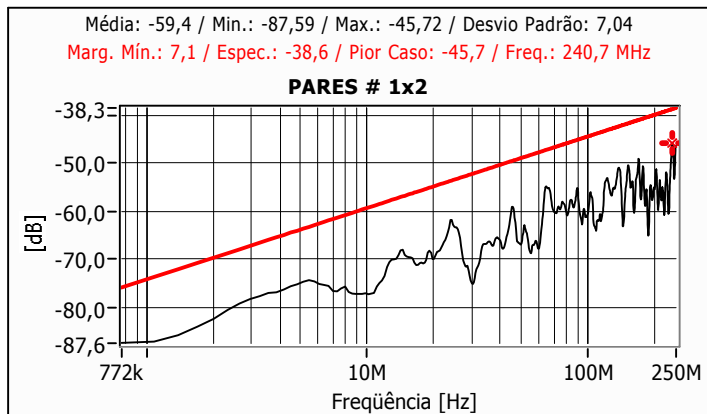


RETURN LOSS



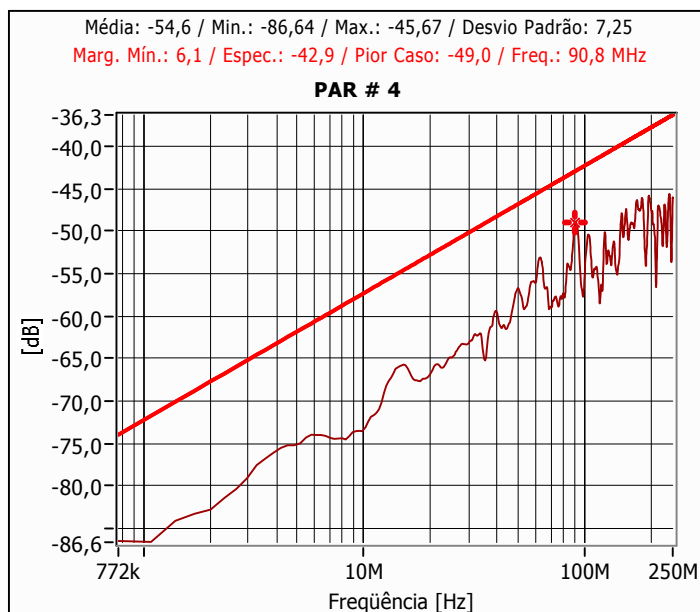
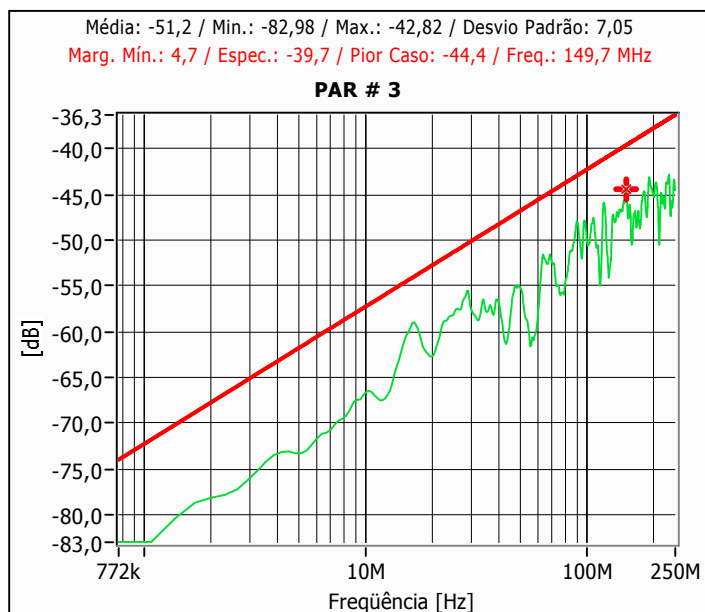
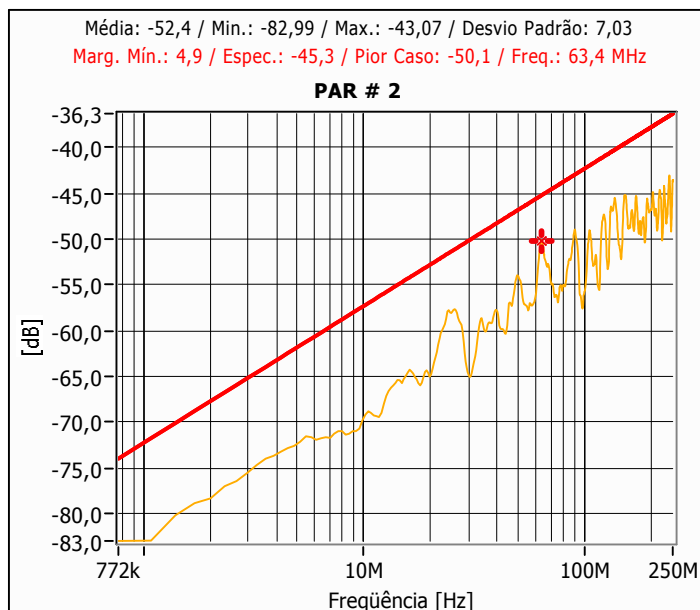
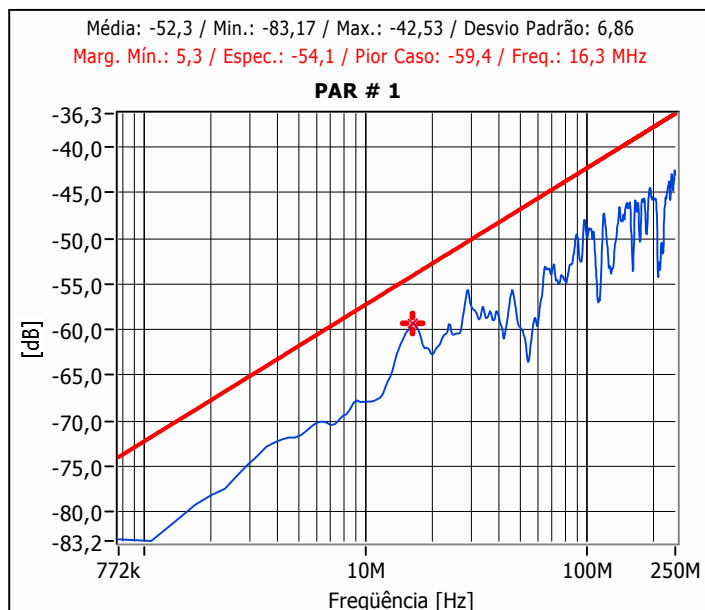
FREQ.	1	2	3	4	MIN.	MAX.	MÉDIA
1,00	24,57	26,51	25,09	28,55	24,57	28,55	26,47
4,00	29,10	26,32	27,12	25,77	25,77	29,10	27,27
8,00	31,04	28,02	28,53	26,97	26,97	31,04	28,91
10,00	31,51	28,27	29,41	27,28	27,28	31,51	29,41
16,00	33,00	30,16	31,52	29,74	29,74	33,00	31,30
20,00	34,53	32,81	31,97	31,94	31,94	34,53	32,94
25,00	34,46	32,73	32,62	33,79	32,62	34,46	33,47
31,25	32,30	30,87	31,84	32,75	30,87	32,75	31,99
62,50	30,39	27,76	30,60	29,38	27,76	30,60	29,67
100,00	31,20	27,16	27,81	25,69	25,69	31,20	28,47
200,00	27,22	22,84	24,49	22,38	22,38	27,22	24,68
250,00	23,93	25,94	28,47	23,31	23,31	28,47	25,90

NEXT



FREQ.	1x2	1x3	1x4	2x3	2x4	3x4	MIN.	MAX.	MÉDIA
0,77	87,59	84,97	99,93	88,25	87,49	94,53	84,97	99,93	93,92
1,00	87,36	85,72	95,27	87,34	88,66	92,91	85,72	95,27	90,98
4,00	76,99	75,15	81,42	79,96	78,99	83,34	75,15	83,34	80,11
8,00	75,80	71,17	79,68	74,95	76,78	83,27	71,17	83,27	78,61
10,00	77,36	68,85	78,89	71,07	76,18	79,26	68,85	79,26	76,66
16,00	69,85	60,63	70,08	66,95	71,74	72,91	60,63	72,91	70,03
20,00	70,03	64,59	70,64	68,33	70,82	73,47	64,59	73,47	70,39
25,00	63,31	64,74	71,50	59,84	70,48	67,82	59,84	71,50	67,95
31,25	72,17	59,48	63,76	65,40	70,50	71,68	59,48	72,17	69,14
62,50	60,75	59,63	65,31	54,93	54,30	60,72	54,30	65,31	60,83
100,00	60,19	51,42	56,98	59,74	61,08	58,80	51,42	61,08	58,90
200,00	55,41	46,43	58,08	53,24	48,85	56,86	46,43	58,08	54,79
250,00	46,37	46,65	52,58	51,59	49,06	51,82	46,37	52,58	50,33

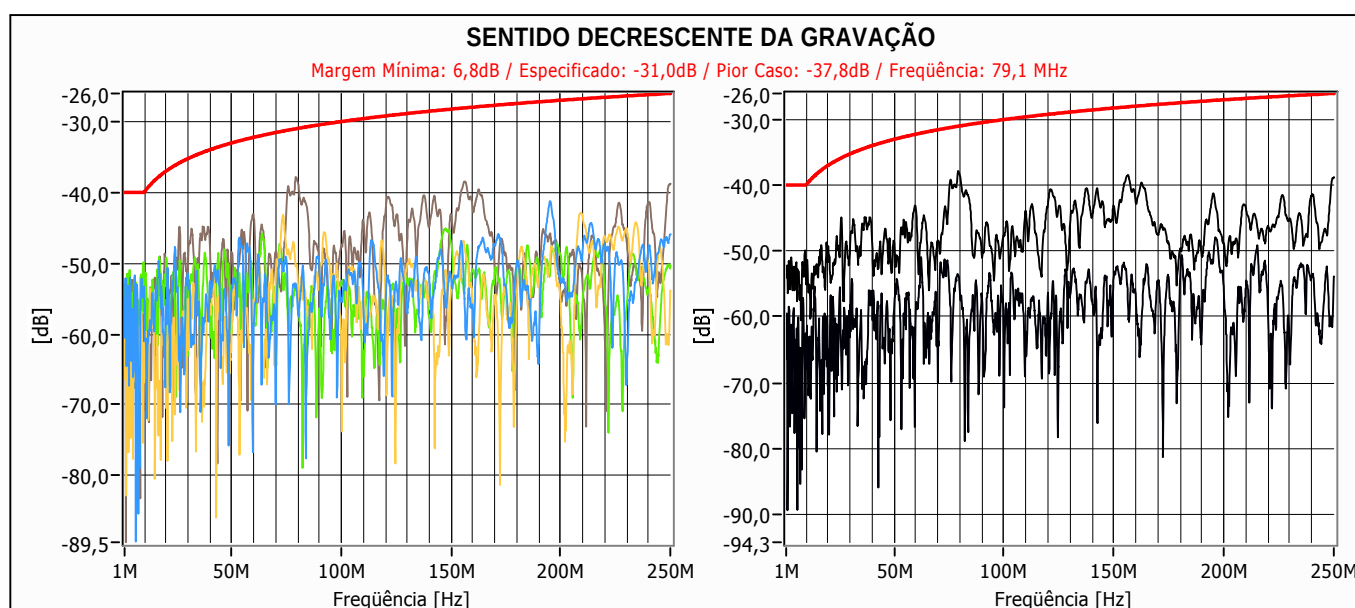
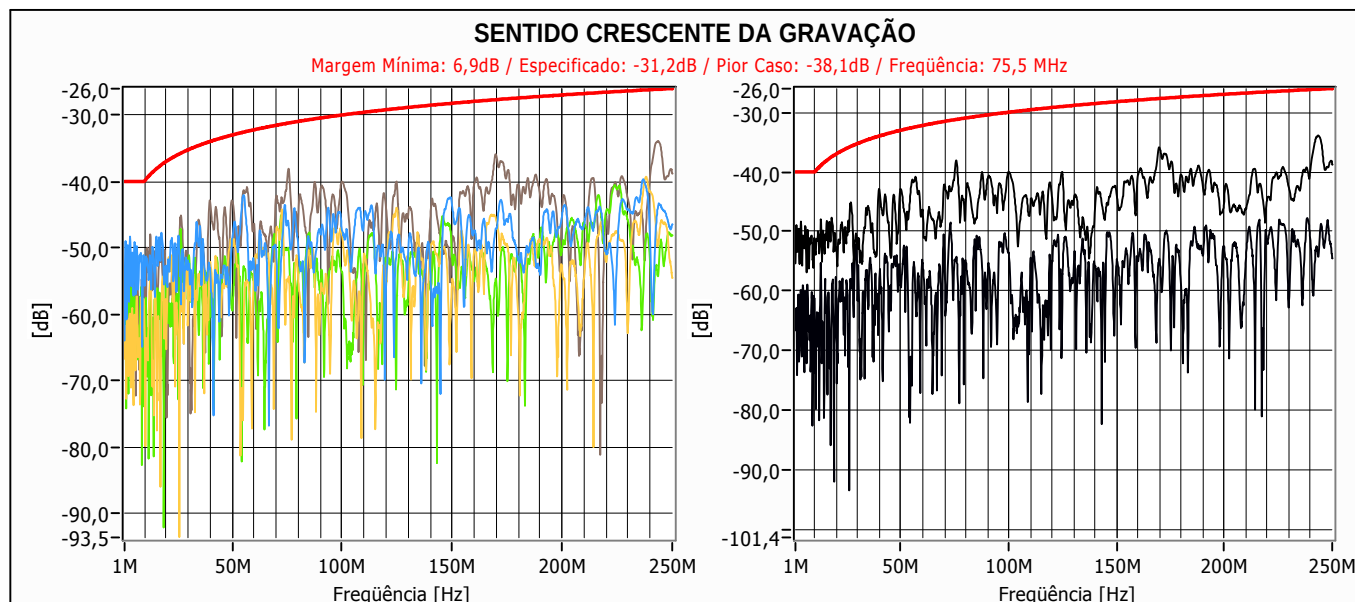
PSNEXT



FREQ.	1	2	3	4	MIN.	MAX.	MÉDIA
0,77	82,98	82,99	82,98	86,50	82,98	86,50	84,16
1,00	83,17	82,97	82,98	86,64	82,97	86,64	84,25
4,00	72,38	73,69	73,44	76,12	72,38	76,12	74,14
8,00	69,45	71,01	69,47	74,38	69,45	74,38	71,59
10,00	67,91	69,18	66,57	73,11	66,57	73,11	69,94
16,00	59,72	64,29	59,51	66,65	59,51	66,65	63,59
20,00	62,73	64,83	62,68	66,70	62,68	66,70	64,56
25,00	60,59	57,97	58,13	64,87	57,97	64,87	61,38
31,25	57,93	63,58	58,29	62,38	57,93	63,58	61,23
62,50	56,53	51,10	52,89	53,14	51,10	56,53	53,89
100,00	49,93	55,53	50,18	53,87	49,93	55,53	53,03
200,00	45,66	46,85	45,29	47,78	45,29	47,78	46,51
250,00	42,99	43,73	44,54	46,11	42,99	46,11	44,50

N. AMOSTRA	AMO-10045-V01	COMPRIMENTO	100 m	DATA/HORA	03/05/2010/10:57
CLIENTE	MICROCENTER	TEMPERATURA	22 C	TÉCNICO	JGONGORA

PERDA DE CONVERSÃO LONGITUDINAL (LCL)



FREQ. [MHz]	SENTIDO CRESCENTE				SENTIDO DECRESCENTE			
	PAR 1	PAR 2	PAR 3	PAR 4	PAR 1	PAR 2	PAR 3	PAR 4
1,00	-63,94	-66,67	-62,70	-55,44	-60,58	-66,39	-56,61	-53,10
4,00	-54,40	-71,05	-59,77	-62,19	-59,15	-67,20	-58,62	-55,98
8,00	-52,01	-73,60	-59,72	-60,32	-72,45	-65,57	-58,92	-66,98
10,00	-54,00	-59,45	-73,87	-53,77	-56,70	-66,92	-54,35	-57,46
16,00	-50,31	-65,03	-56,05	-58,74	-54,97	-60,23	-50,88	-57,28
20,00	-52,71	-65,25	-53,99	-64,52	-56,86	-70,48	-49,23	-53,02
25,00	-53,28	-59,42	-58,12	-50,70	-54,08	-61,19	-57,06	-49,68
31,25	-53,62	-57,29	-57,27	-71,31	-59,15	-54,18	-51,74	-46,36
62,50	-47,39	-48,77	-58,94	-47,66	-51,04	-50,42	-48,76	-48,06
100,00	-47,49	-48,24	-53,66	-40,11	-55,30	-63,53	-52,76	-47,71
200,00	-44,74	-53,28	-50,10	-43,71	-52,35	-57,07	-48,97	-55,11
250,00	-46,45	-54,54	-48,11	-38,80	-45,93	-53,90	-50,32	-38,81