

SIEMENS

SECTION 2

Siemens Transformers S.p.A., via di Spini n. 9
38121 TRENTO - ITALY

Transformer	N°	:	140532C/08		
Power	[MVA]	:	40,000	ONAN	
Voltage HV	[kV]	:	132,000	± 12 x	1,250%
Voltage MV	[kV]	:	15,600	-	-
Vector Group		:	Y y n 0	-	
Frequency	[Hz]	:	50		
Type of cooling		:	ONAN	-	

LIST OF TESTS PERFORMED ACCORDING TO STANDARD:

IEC 60076

TYPE AND/OR SPECIAL TESTS

Pages

Check of guaranted values.	-	÷	2
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Frequency response analysis (SFRA)	7	÷	23

Date

12 ÷ 13/10/15

Customer

Siemens Transformers S.p.A.
Testing Service

Siemens Transformers S.p.A.

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Transformer		N°	:	140532C/08			
Power		[MVA]	:	40,000	ONAN	/	-
Voltage	HV	[kV]	:	132,000	± 12 x		1,250%
Voltage	MV	[kV]	:	15,600	-		-

Summary of guaranteed and measured values

Determination of sound level (IEC 60076-10) for each method of cooling for which a guaranteed sound level is specified.

ONAN (Vn)	40,000 MVA	Guaranteed	Tolerances	Measured	u%
Corrected mean sound power level Lw(A)		70,00 dB	+ 0 %	69,44 dB	± 1,008 %

Date

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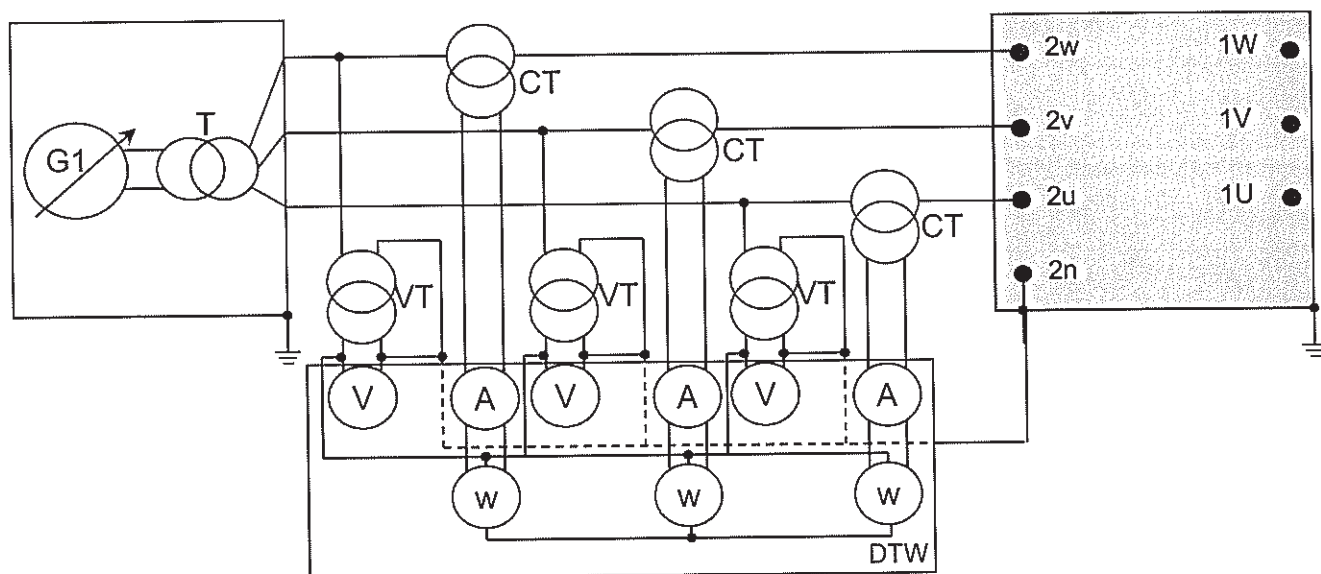
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Transformer		N°	:	140532C/08		
Power		[MVA]	:	40,000	ONAN	/ - -
Voltage	HV	[kV]	:	132,000	± 12 x	1,250%
Voltage	MV	[kV]	:	15,600	-	-
Voltage	(D)	[kV]	:	-	-	-
Vector Group			:	Y y n 0		

Measurement of sound level.

(Vn)



G1	:	Generator IF	
T	:	Transformer	
VT	:	Voltage Transformers	6000-12000-18000/100 10 VA CL.02 NMG VCR3Z/S1 n°9304335 - 9304336 - 9304337
CT	:	Current Transformers	10-20 / 5 30 VA CL.02 CGS ASR36L n° 7825365 - 7825366 - 7825367
DTW	:	STM100 Threephase digital Wattmeter type D5255T n° H688689LB	

References / Standards:

- IEC 60076-10 (2001), Power transformers - Part 10: "Determination of sound levels"[7]
- IEC 60076-10 (2001), Power transformers - Part 10-1: Draft: "Determination of transformer and reactor sound levels"
- User guide[30]

Date 13/10/15

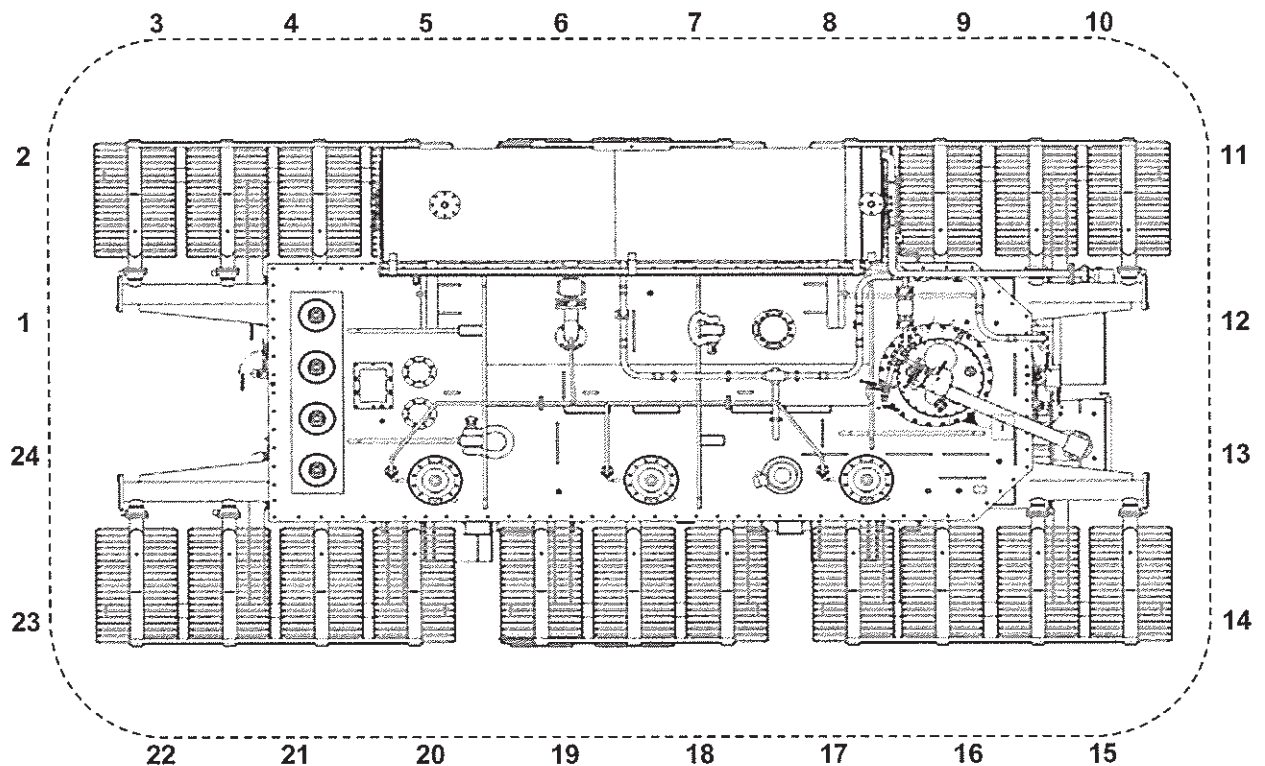
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Transformer		N°	:	140532C/08			
Power		[MVA]	:	40,000	ONAN	/ -	-
Voltage	HV	[kV]	:	132,000	± 12 x	1,250%	
Voltage	MV	[kV]	:	15,600	-	-	
Voltage	(D)	[kV]	:	-	-	-	
Vector Group			:	Y y n 0			

Measurement of sound level. (Vn)

Measures Points. ONAN



Instrument used: STM160 Bruel & Kjaer 2260

n° 2627605

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Power	[MVA]	:	40,000	ONAN	/ - -
Voltage	HV [kV]	:	132,000	± 12 x	1,250%
Voltage	MV [kV]	:	15,600	-	-
Vector Group		:	Y y n 0		

Determination of sound level (IEC 60076-10) for each method of cooling for which a guaranteed sound level is specified.

(Vn)

Measures Points.	Background noise measure LbgAi [dBA]	ONAN		ONAF		Background noise measure LbgAf [dBA]
		Measure at 1/2 h LpAi [dBA]	- LpAi [dBA]	Measure at 1/2 h LpAi [dBA]	- LpAi [dBA]	
1	30,0	58,1				30,0
2		53,1				
3		49,0				
4		54,5				
5		54,2				
6		53,2				
7		51,6				
8		53,3				
9		55,2				
10		49,1				
11		46,2				
12		49,1				
13		50,7				
14		48,2				
15		48,9				
16		49,3				
17		51,8				
18		45,2				
19		50,9				
20		52,6				
21		50,0				
22		49,1				
23		47,7				
24		49,6				
25						
26						
27						
28						
29						
30						
LpA0 (min ONAN) – max LbgA		=		21,9	≥ 8	OK
LpA0 (min ONAF) – max LbgA		=		N.A.	≥ 8	OK
LbgAi – LbgAf		=		0,0	< 3	OK

Unless pA0 L is less than the guaranteed value, in which case the test object should be considered to have met the guaranteed level

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Voltage HV	[kV]	:	132,000	± 12 x	1,250%
Voltage MV	[kV]	:	15,600	-	-
Vector Group		:	Y y n 0		

Determination of sound level (IEC 60076-10) for each method of cooling for which a guaranteed sound level is specified.

ONAN

Height of tank	h	[m]	=	2,480
Measured contour	l	[m]	=	21,170
Prescribed contour	l_m	[m]	=	23,055
Effective surface at 0.3 meters	$S = 1,25 \times h \times l_m$	[m ²]	=	71,470
Points of measure n°			=	24
Microphone distance	d	[m]	=	0,300
Sound absorption area	$A = \alpha \times S_v$ ($\alpha=0,5$)	[m ²]	=	1241,75
Environmental correction (K)	$k = 10\lg(1+4/(A/S))$	[dB]	=	0,90
Background sound level (mean value)	$L_{bgA} = 10\lg \left(\frac{1}{M} \sum_{i=1}^M 10^{0,1L_{bgAi}} \right)$	[dB]	=	30,00
Uncorrected average A-weighted sound pressure level L_{pA0}	$L_{pA0} = 10\lg \left(\frac{1}{N} \sum_{i=1}^N 10^{0,1L_{pAi}} \right)$	[dB]	=	51,93
Corrected average A-weighted sound pressure level L_{pA}	$L_{pA} = 10\lg \left(10^{0,1L_{pA0}} - 10^{0,1L_{bgA}} \right)$	[dB]	=	51,00
Guaranteed A-weighted sound power level $L_w(A)$	L_{pA}	[dB]	=	70,00
Corrected average A-weighted sound power level $L_w(A)$	$L_wA = L_{pA} + 10\lg(S)$	[dB]	=	69,54

Result : SATISFACTORY.

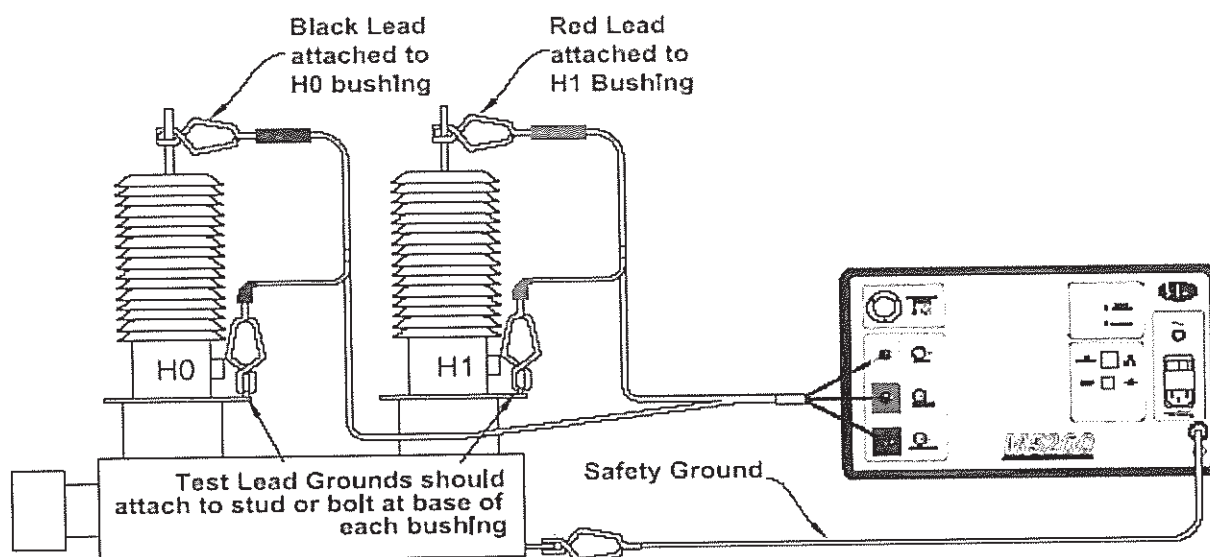
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Testing Service

Transformer	N°	:	140532C/08			
Power	[MVA]	:	40,000	ONAN	-	-
Voltage	HV	[kV]	132,000	± 12 x	1,250%	
Voltage	MV	[kV]	15,600	-		
Vector Group		:	Y y n 0			

Frequency response analysis (SFRA)



Instrument used: Doble 5200 n° 120700341

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Transformer	N°	:	140532C/08		
Power	[MVA]	:	40,000	ONAN	-
Voltage	HV [kV]	:	132,000	± 12 x	1,250%
Voltage	MV [kV]	:	15,600	-	
Vector Group		:	Y y n 0		

Frequency response analysis (SFRA)

Graph N°	Terminals connected	HV Tap position	MV Tap position	Windings in short-circuit	Windings earthed
1	1U-1W	+12	-	no	no
2	1U-1W	0	-	no	no
3	1U-1W	-12	-	no	no
4	1V-1U	+12	-	no	no
5	1V-1U	0	-	no	no
6	1V-1U	-12	-	no	no
7	1W-1V	+12	-	no	no
8	1W-1V	0	-	no	no
9	1W-1V	-12	-	no	no
10	1U-1W	+12	-	MT	no
11	1V-1U	+12	-	MT	no
12	1W-1V	+12	-	MT	no
13	2u-2n	+12	-	no	no
14	2v-2n	+12	-	no	no
15	2w-2n	+12	-	no	no

Result: The waves will be considered with finger printing of the transformers as reference for future comparisons.

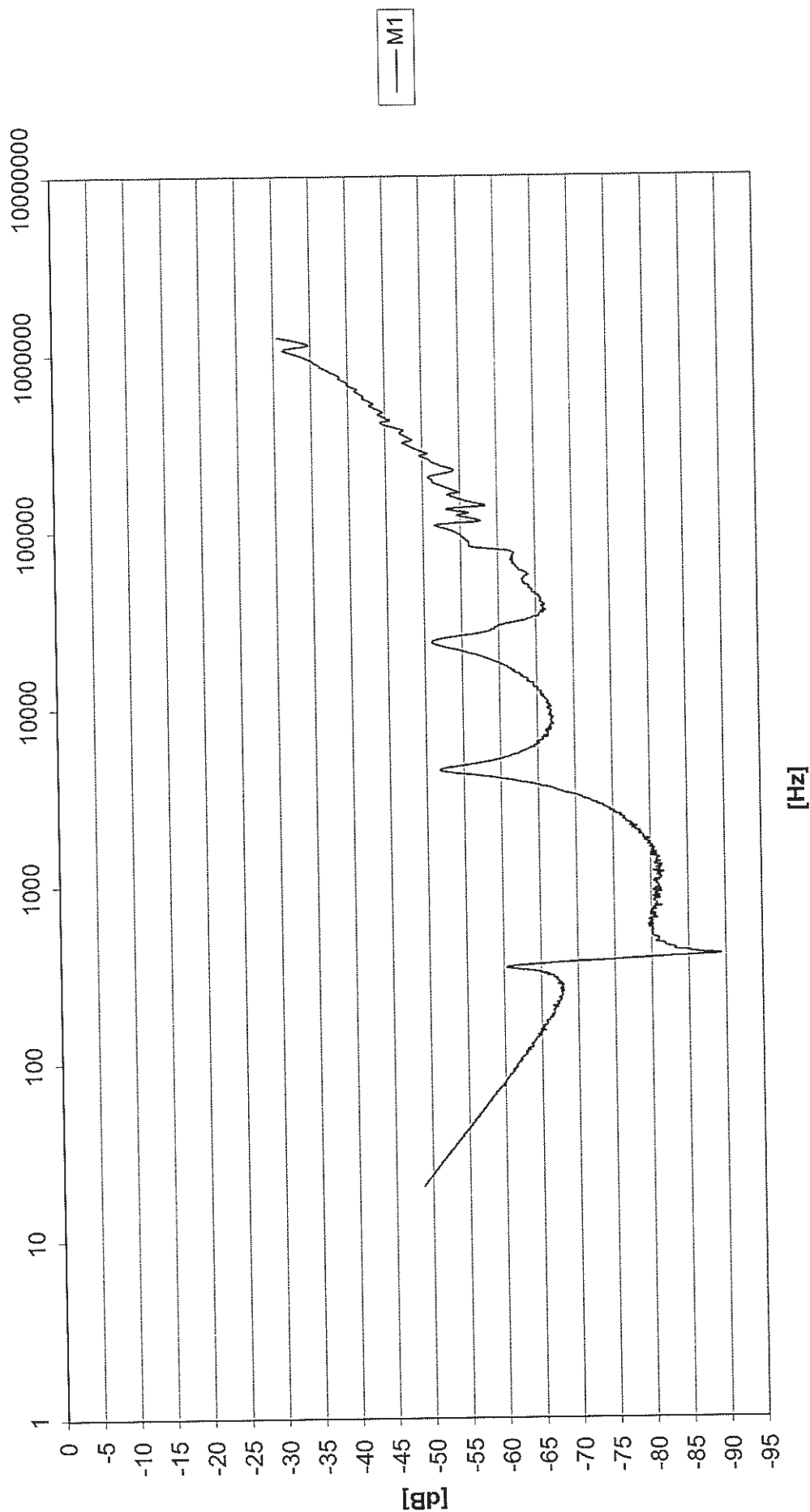
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Siemens Transformers S.p.A.
Testing Service

Transformer : N. 140532C/08

1



Customer

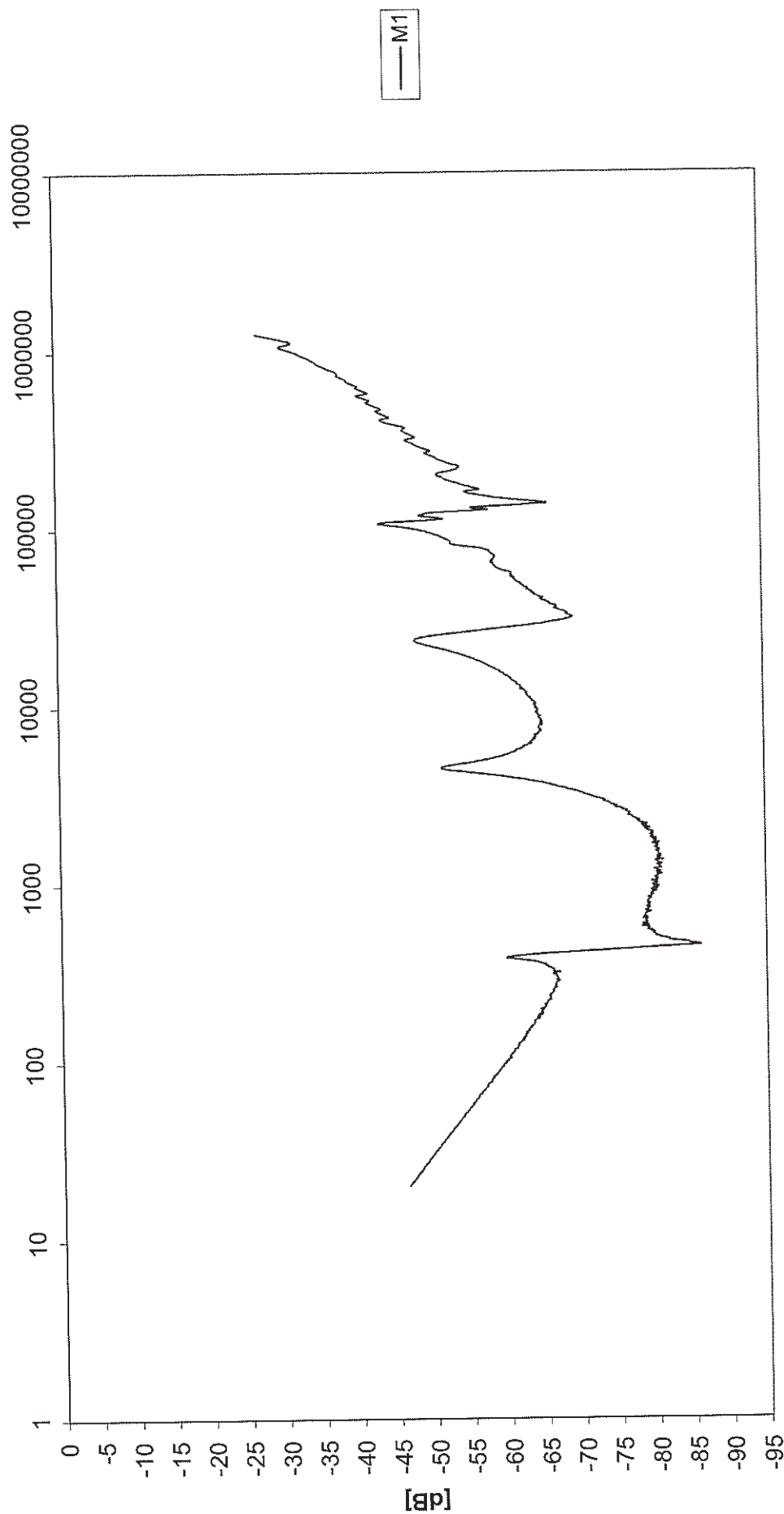
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Siemens Transformatore S.p.A.
Testing Service

Restricted

Transformer : N. 140532C/08

2



[Hz]

Date

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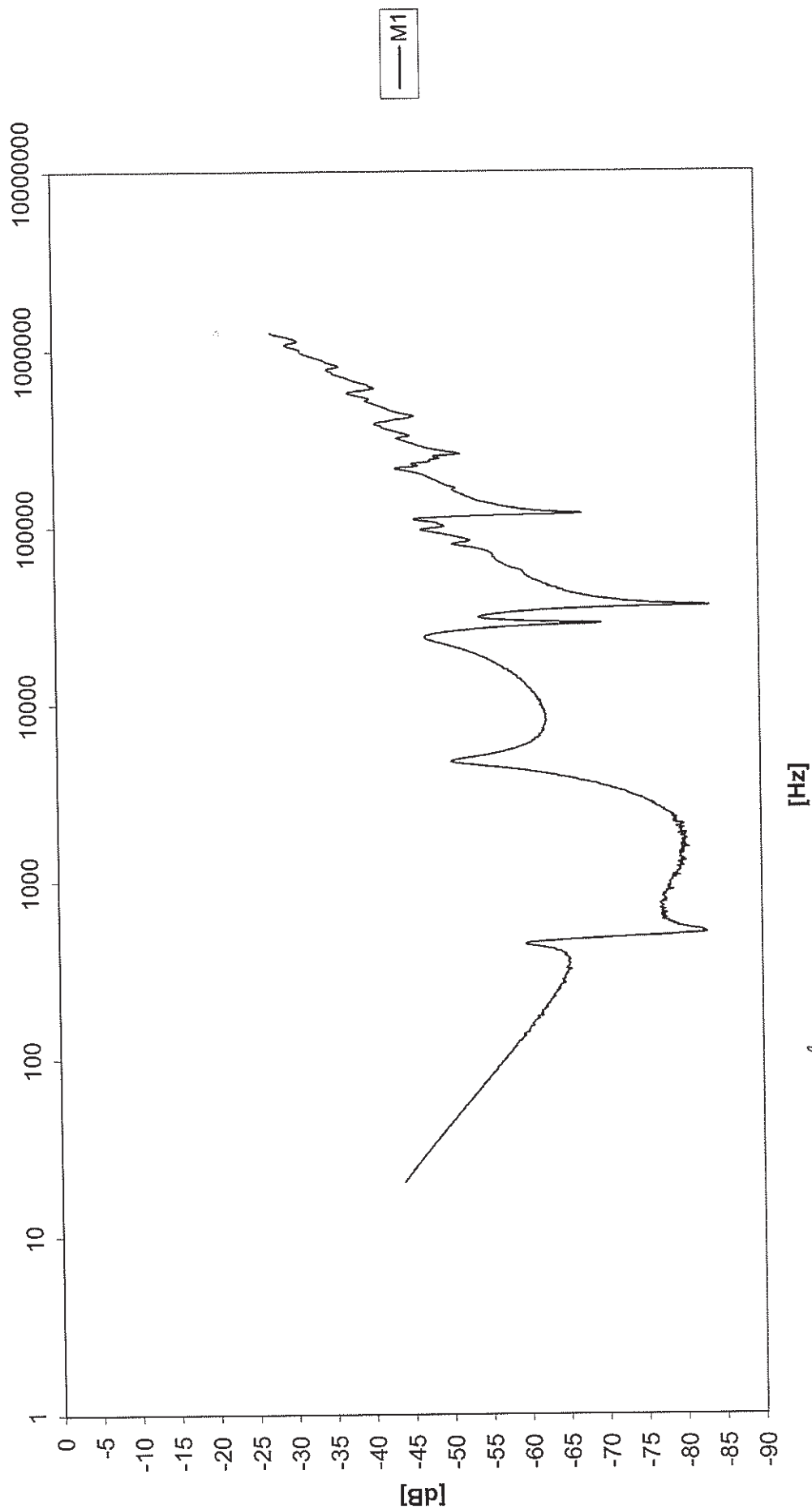
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Customer

Restricted

Transformer : N. 140532C/08

3

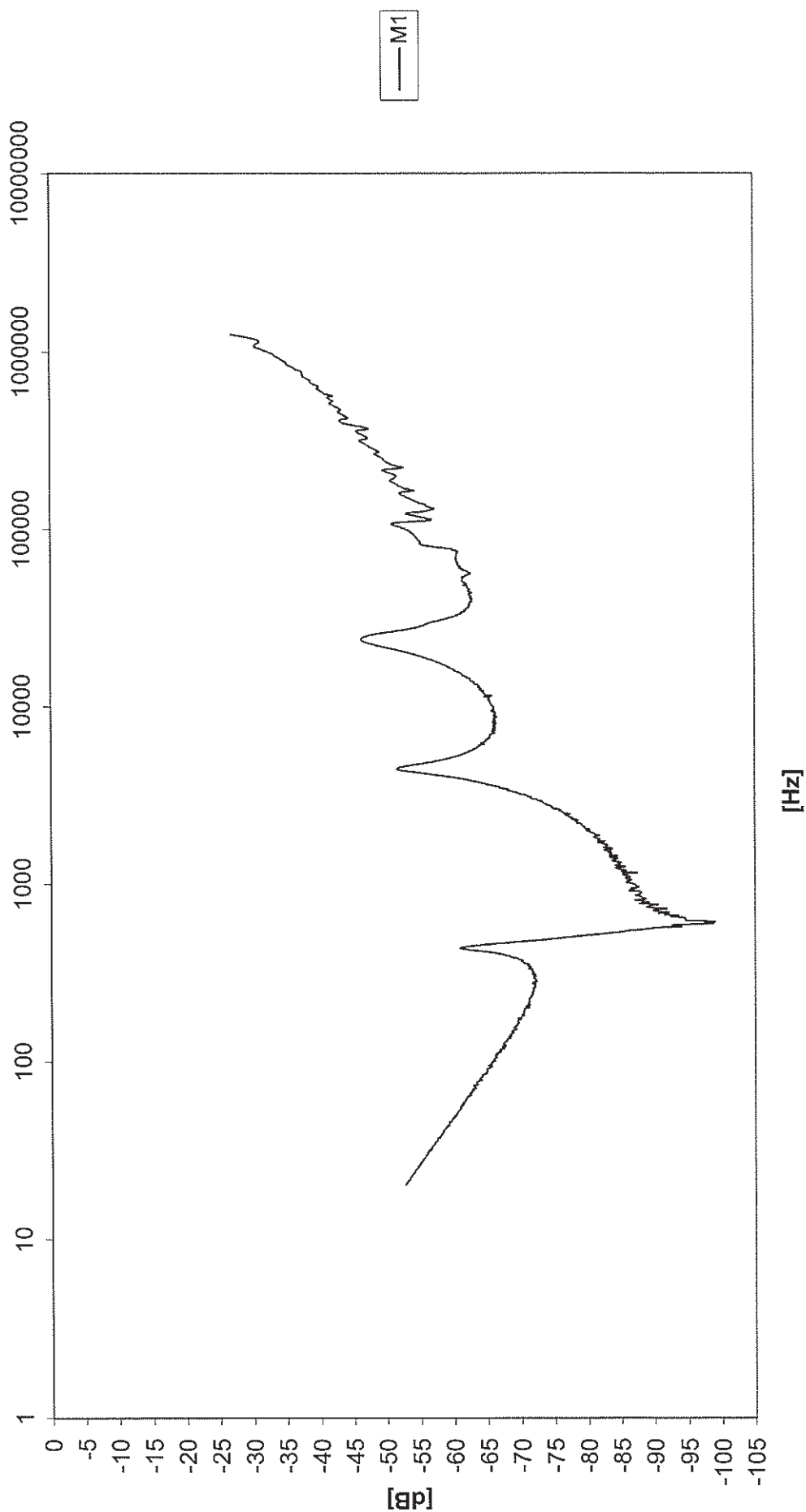


Customer

Date 12 ÷ 13/10/15 Siemens Transformers S.p.A.
Testing Service

Restricted

4



Customer

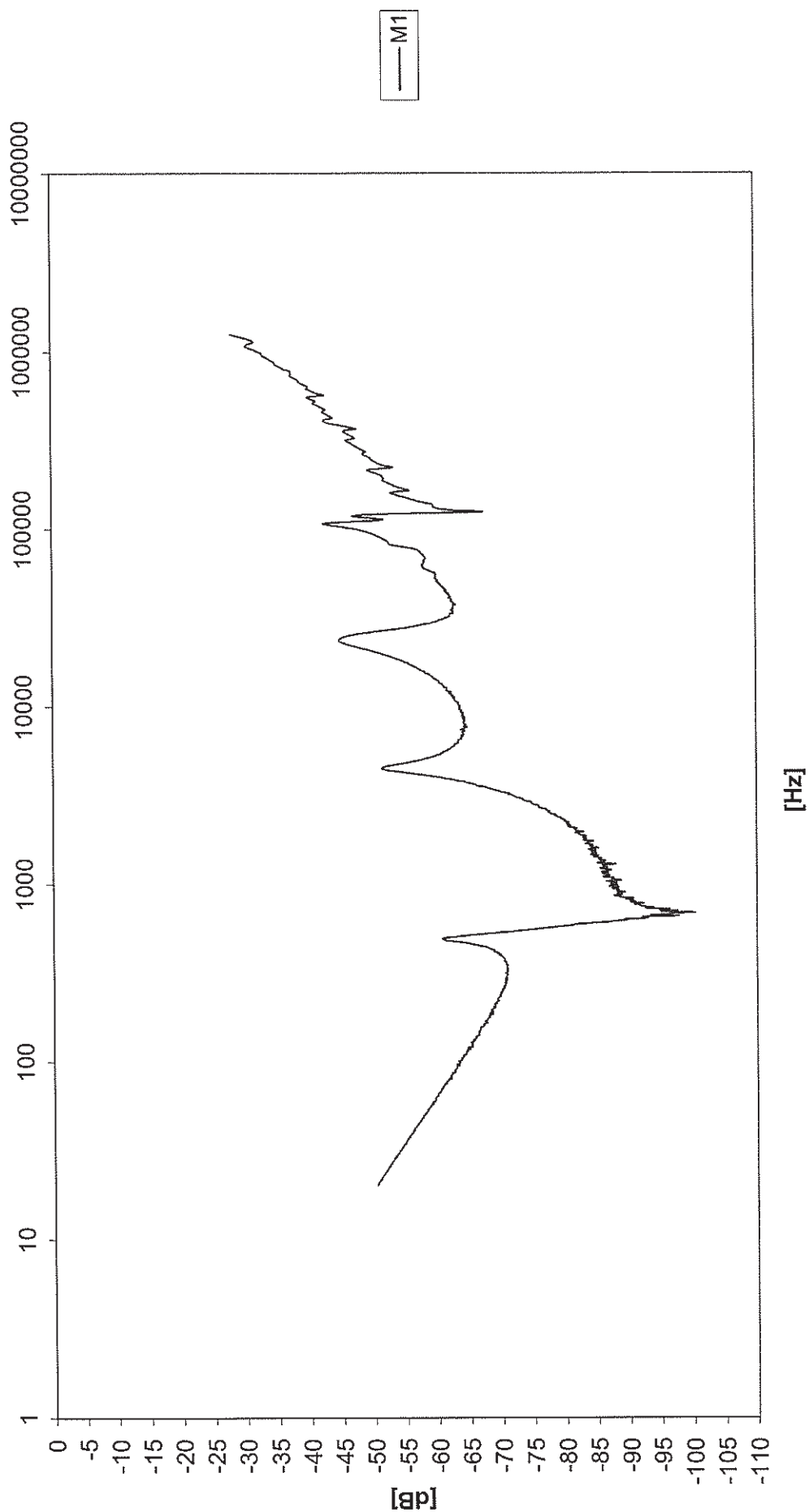
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Transformer : N. 140532C/08

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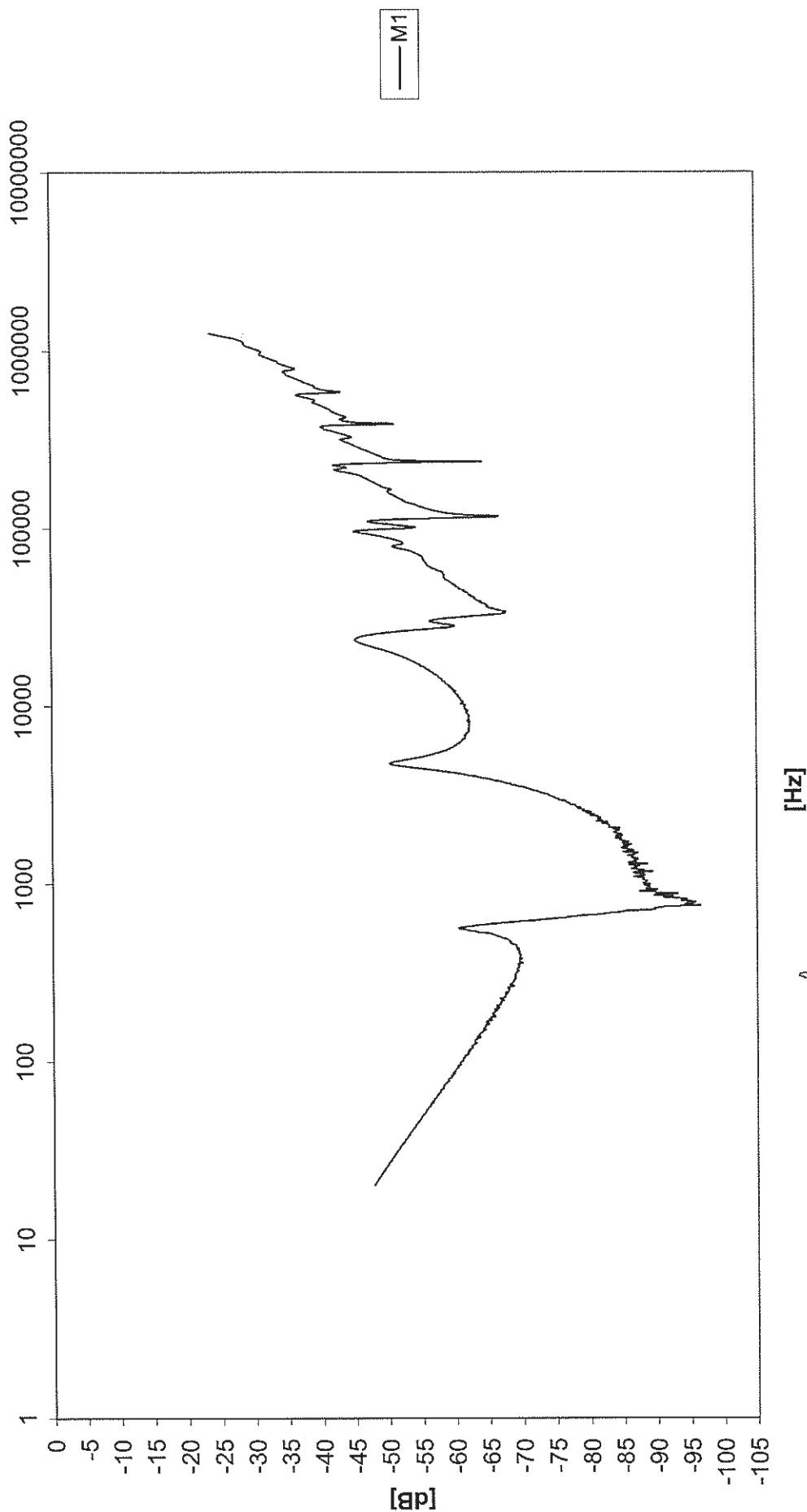
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Transformer : N. 140532C/08



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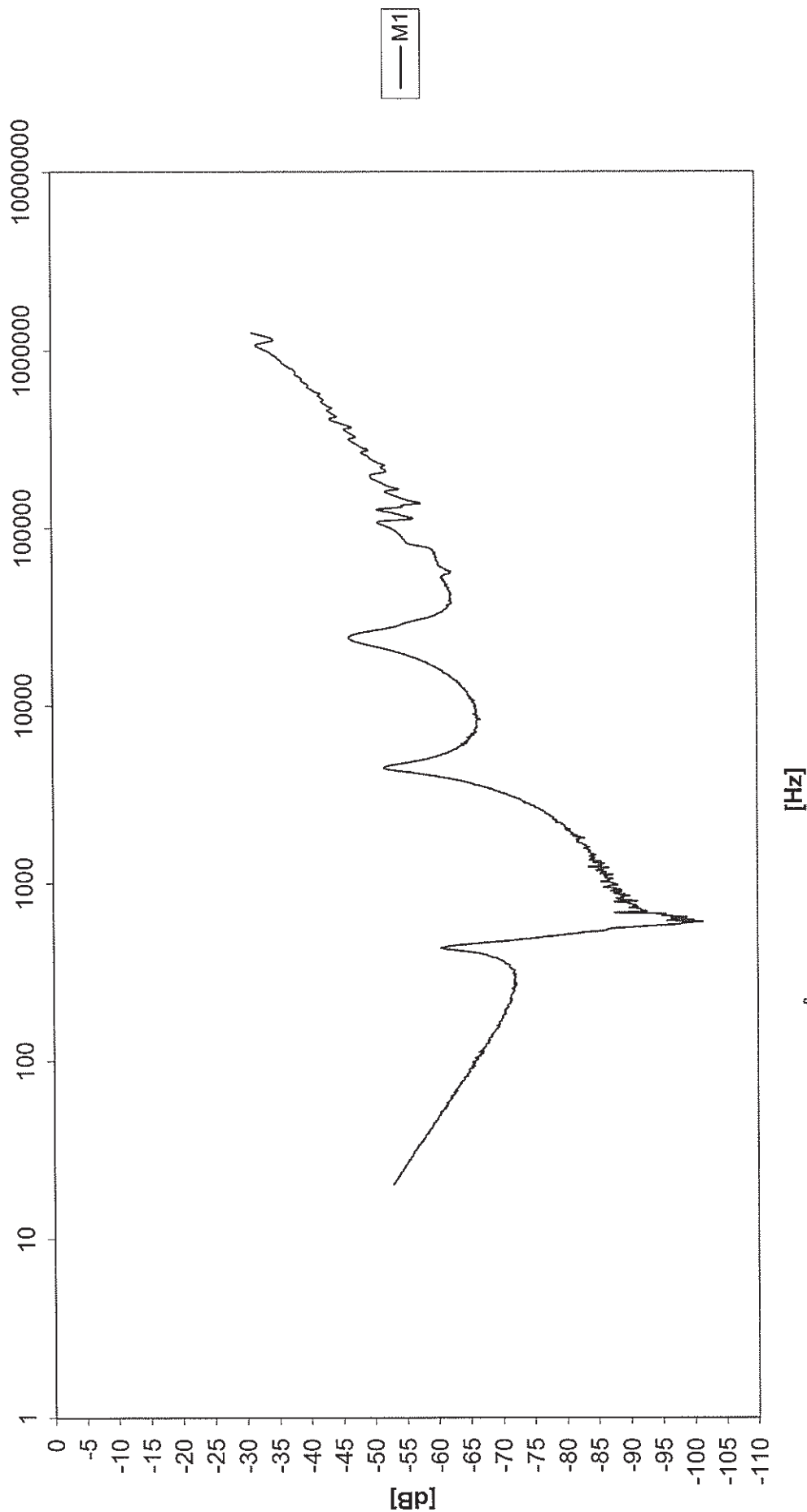
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Transformer : N. 140532C/08



Customer

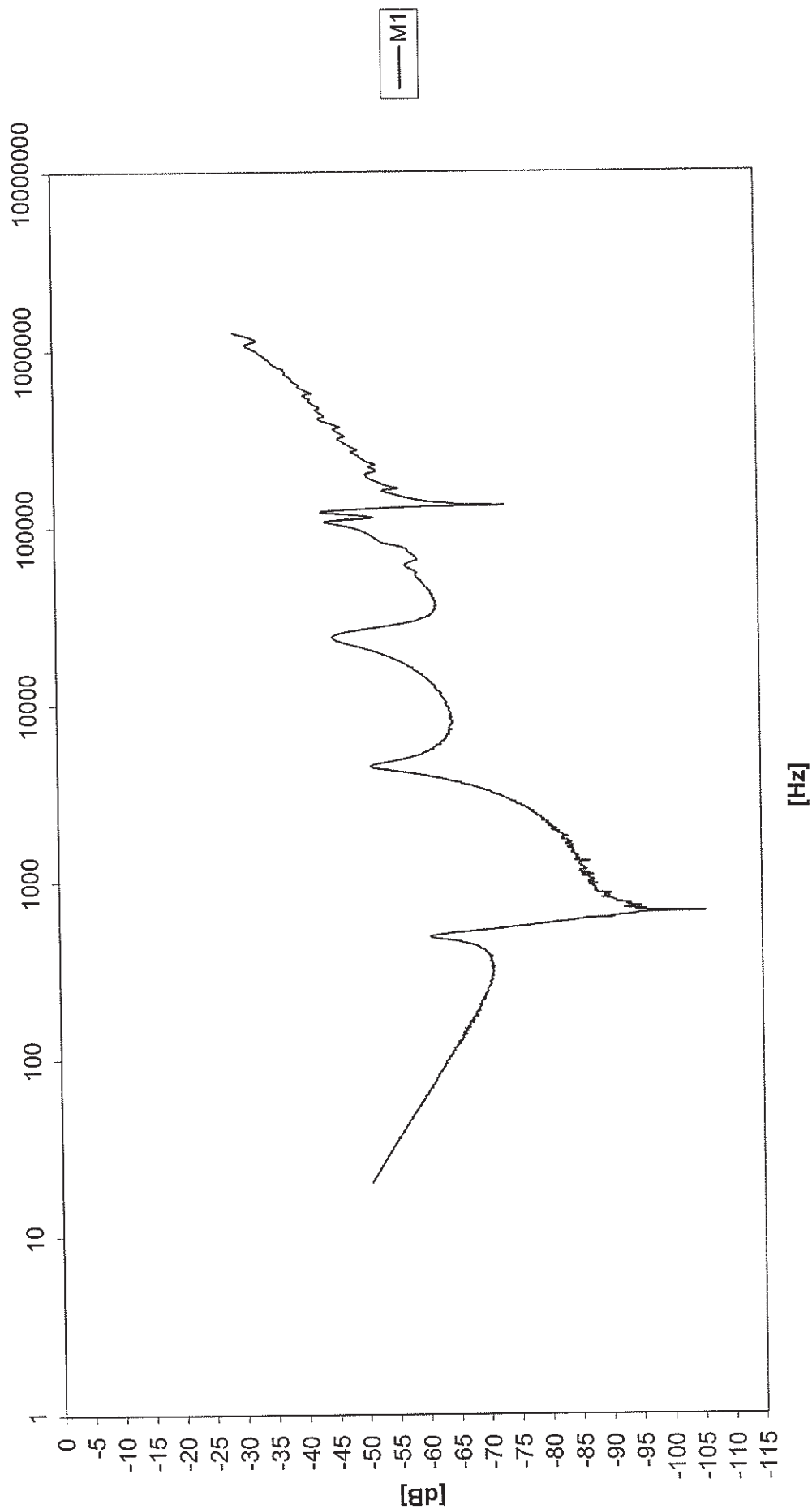
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Transformer : N. 140532C/08

8



Customer

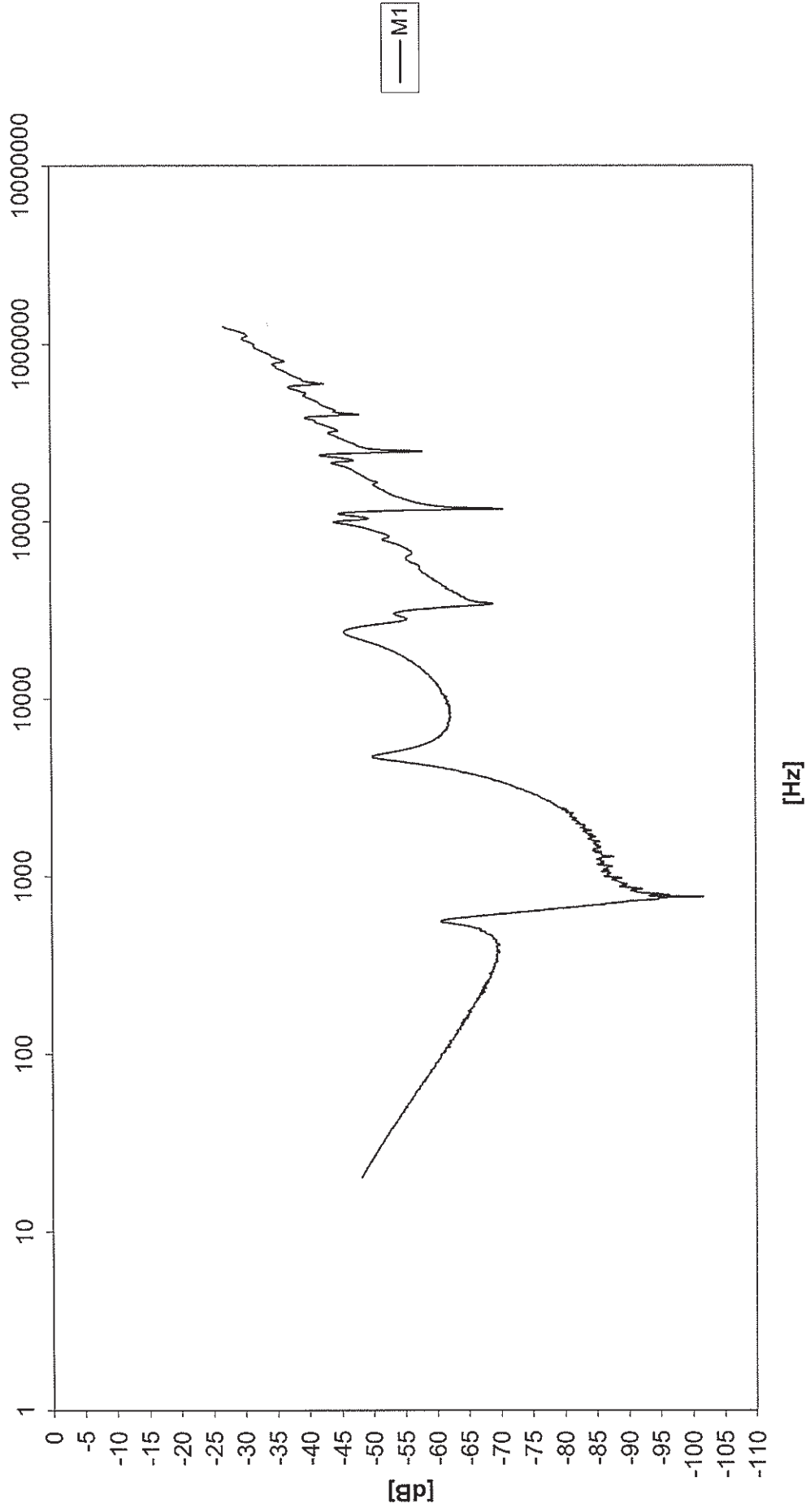
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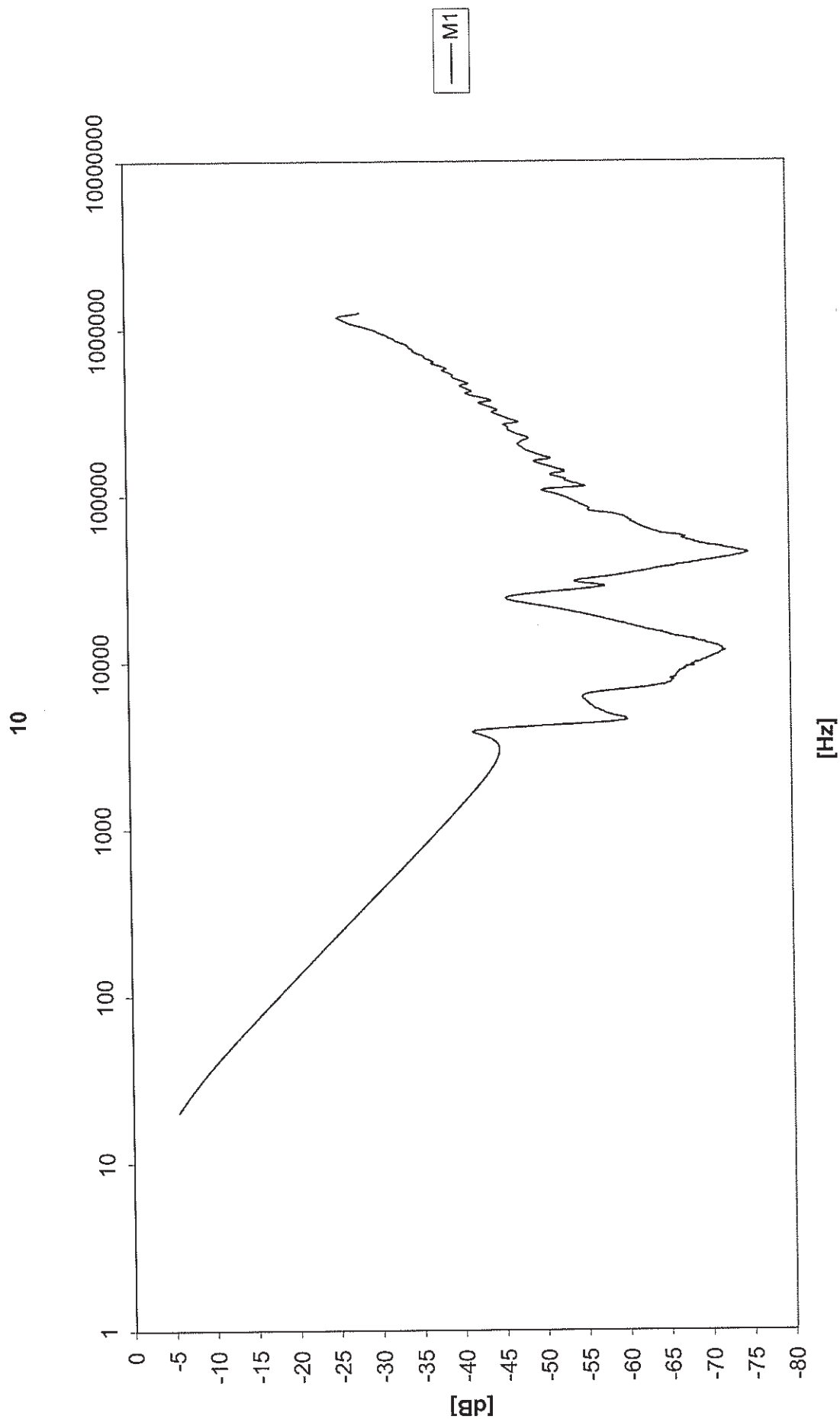
Customer

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Transformer : N. 140532C/08



Customer

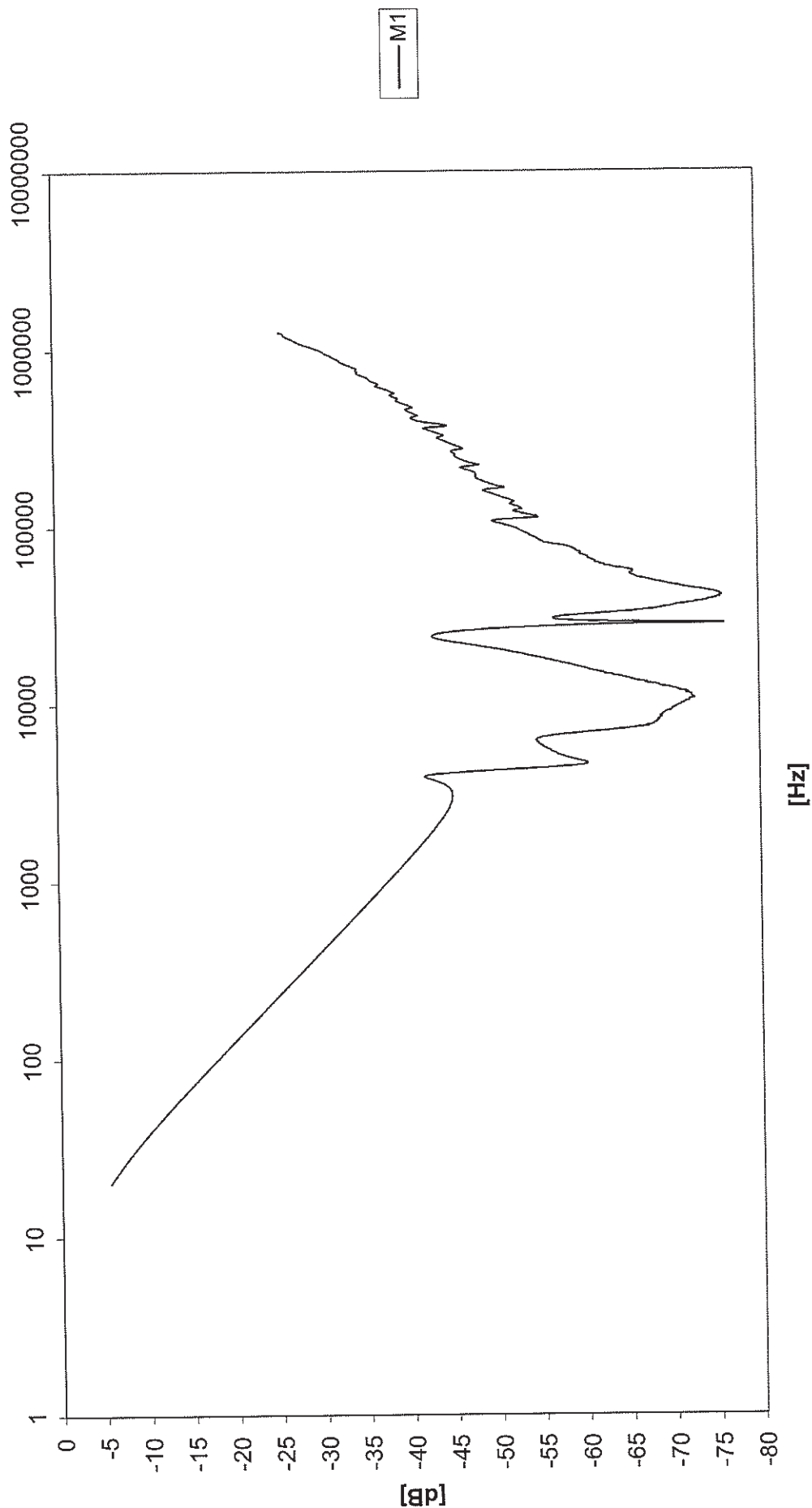
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Transformer : N. 140532C/08



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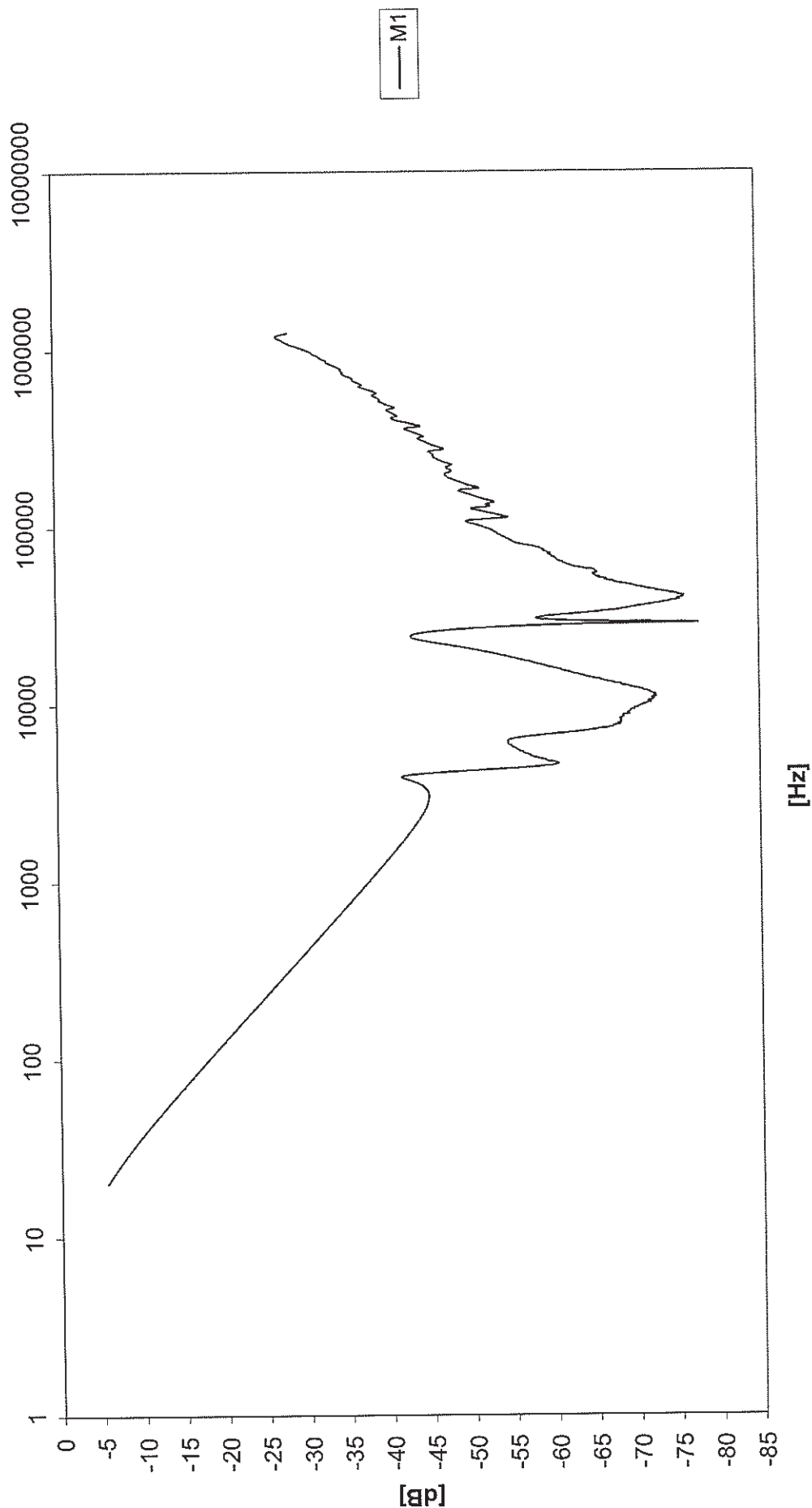
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Transformer : N. 140532C/08

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Customer

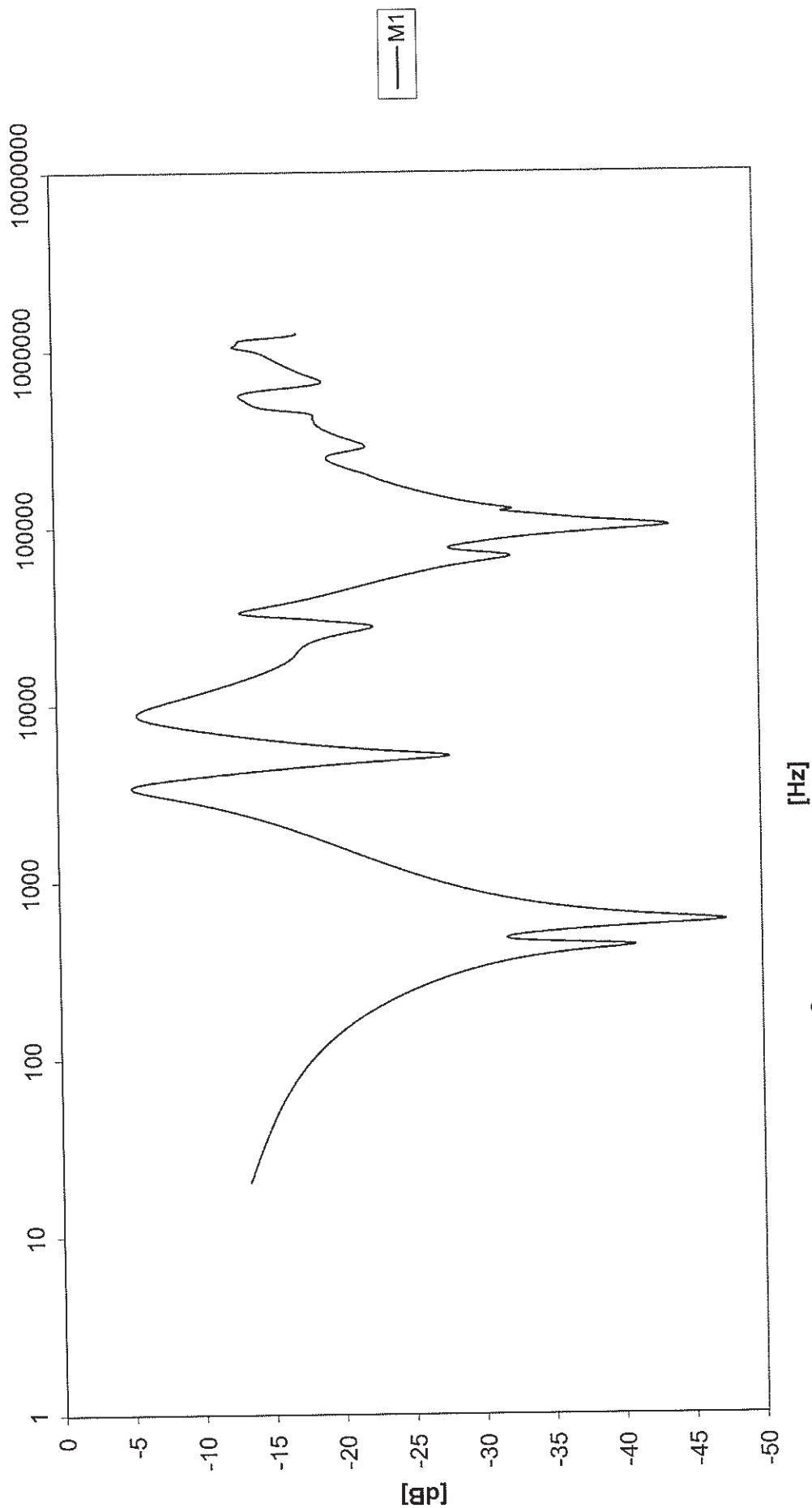
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Transformer : N. 140532C/08

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Customer

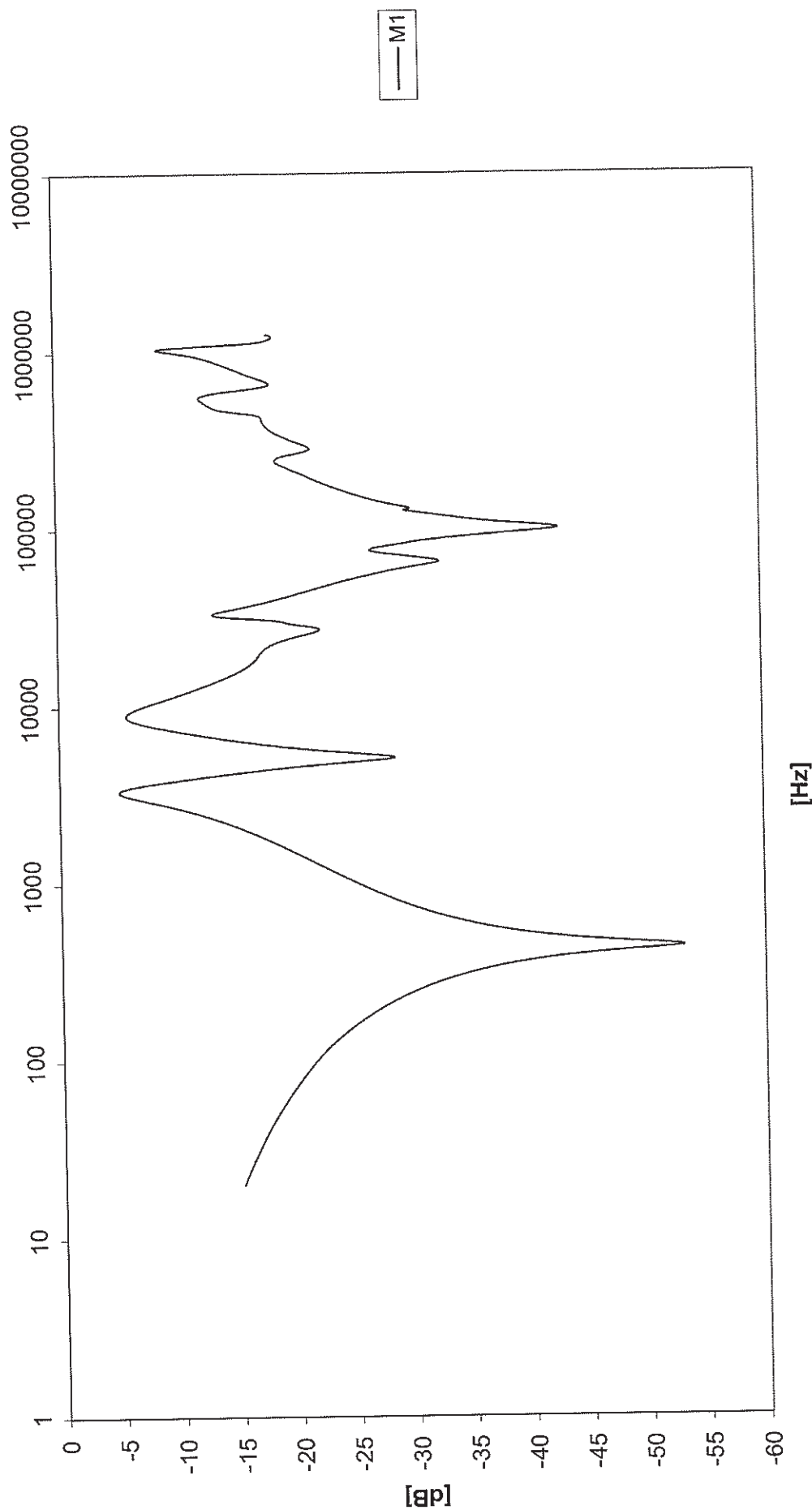
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Transformer : N. 140532C/08

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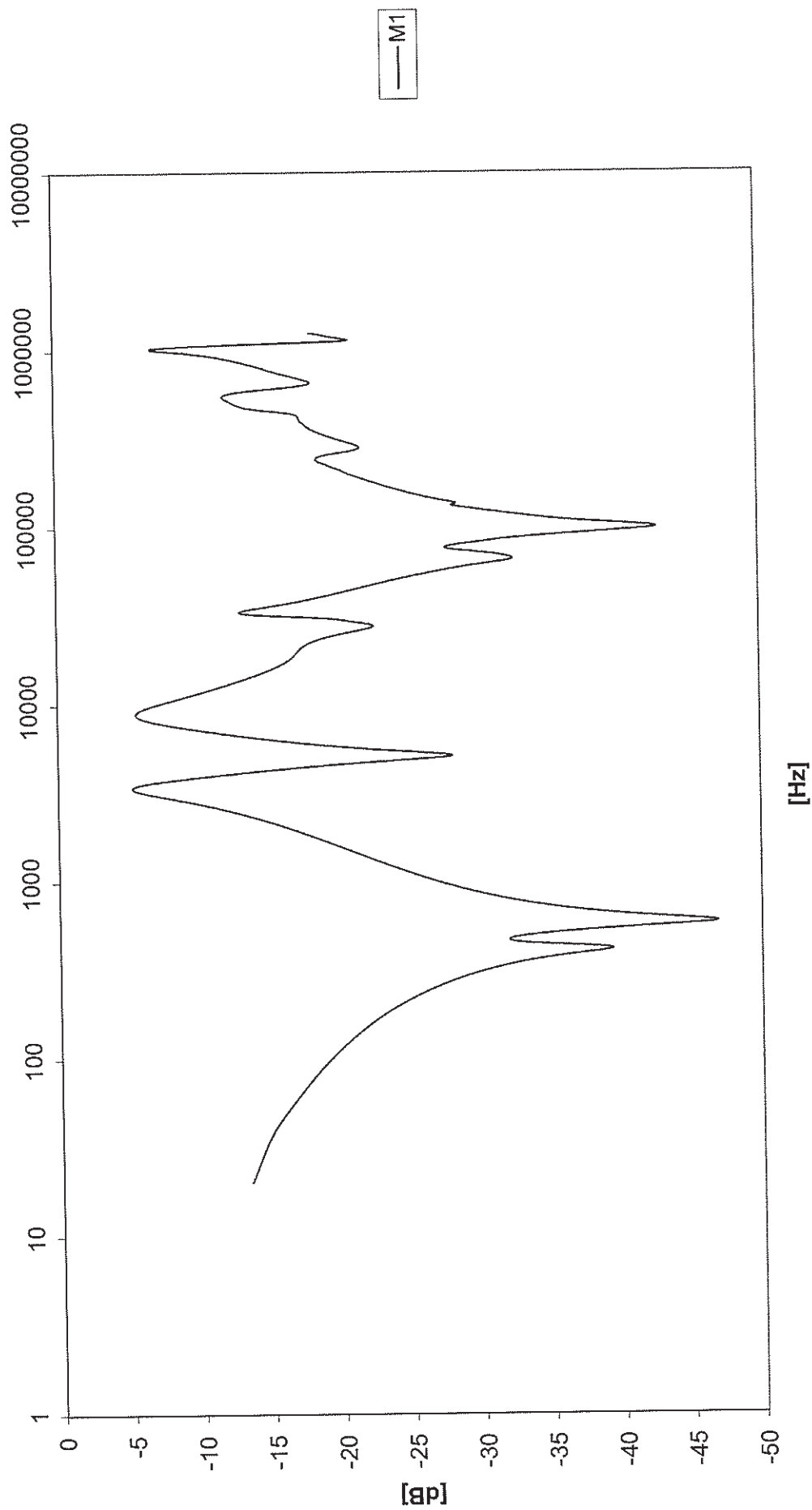
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Transformer : N. 140532C/08

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Customer

Date 12 ÷ 13/10/15

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