

Large Signal Identification (LSI) Report

Test Performed by Erin H on behalf of

DIYmobileaudio.com

Date: 6/25/2011

Driver Name: Peerless HDS 8

Link to Driver:

https://www.madisound.com/store/product_info.php?products_id=1614

<http://www.parts-express.com/pe/showdetl.cfm?Partnumber=264-1098>

Picture:



Peerless HDS 8" Post Break-In

Q, Fs complete Vas not complete Box not complete

Re = 6.2484 ohms Vas = 83.1501 L (2.9364 ft^3) Fsb = 0.0000 Hz
Fs = 26.3861 Hz Diam= 162.5634 mm (6.4001 in) alpha= 1.0000
Qes = 0.3338 Sd = 20755.6058 mm^2(32.1713 in^2) Ha = 0.0000
Qms = 5.5963 BL = 9.0310 N/A Fm = 0.0000 Hz
Qts = 0.3150 Cms = 1358.7111 um/N Qloss=3333.0000
Zmax= 110.9992 ohms Kms = 735.9916 N/m
Le = 0.7072 mH Mms = 26.2160 g Vb = 31.8500 L
Sens= 88.4567 dB@1W/1m Vb = 1.1248 ft^3
Eff = 0.4404 %
CPU =20.3% Rms = 0.7632 ohms Sine Impedance::Norm

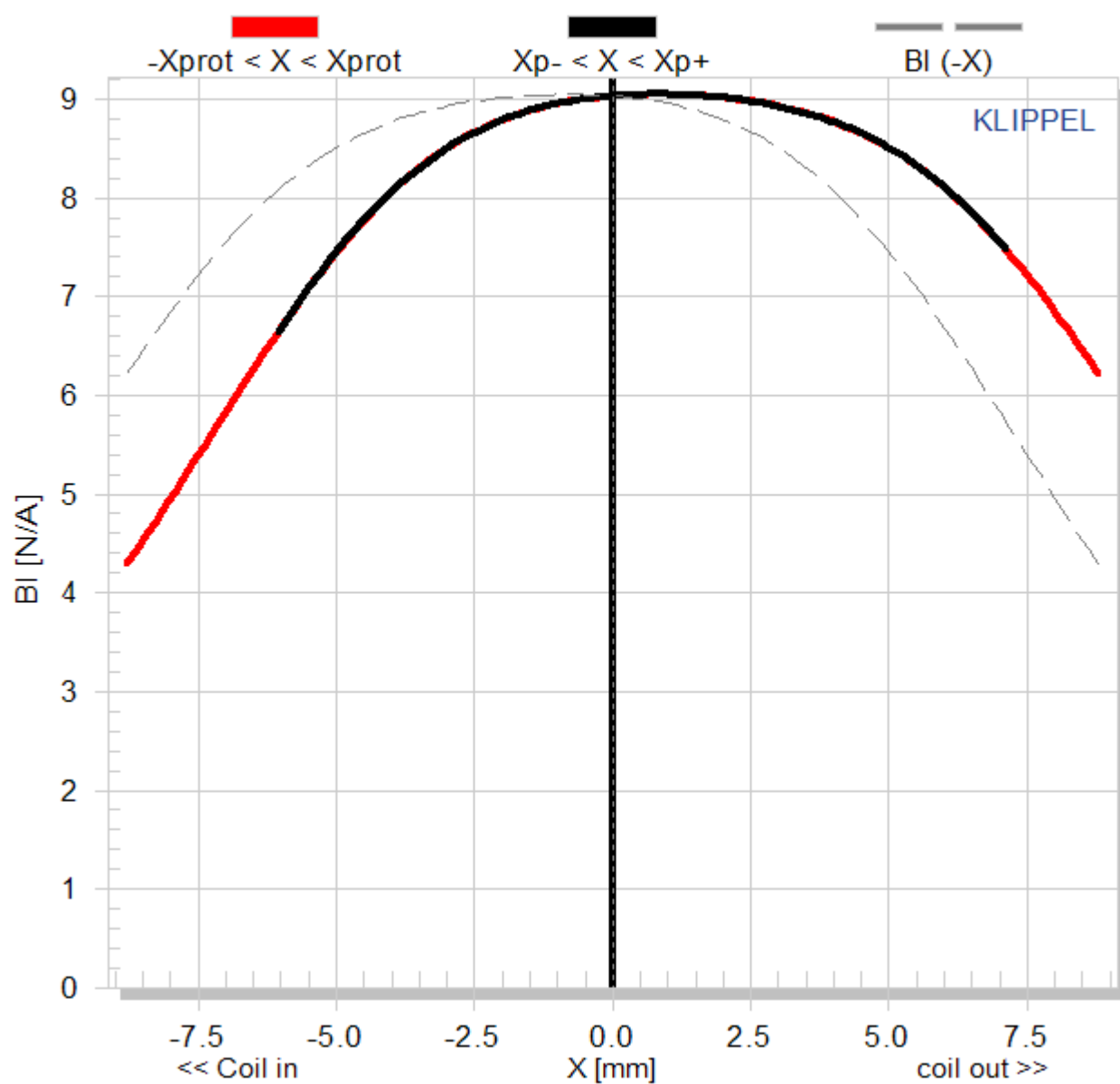
Auto Data Sine, LoZP->Q/Fs, 98pt

Phase degrees

Impedance (ohms)

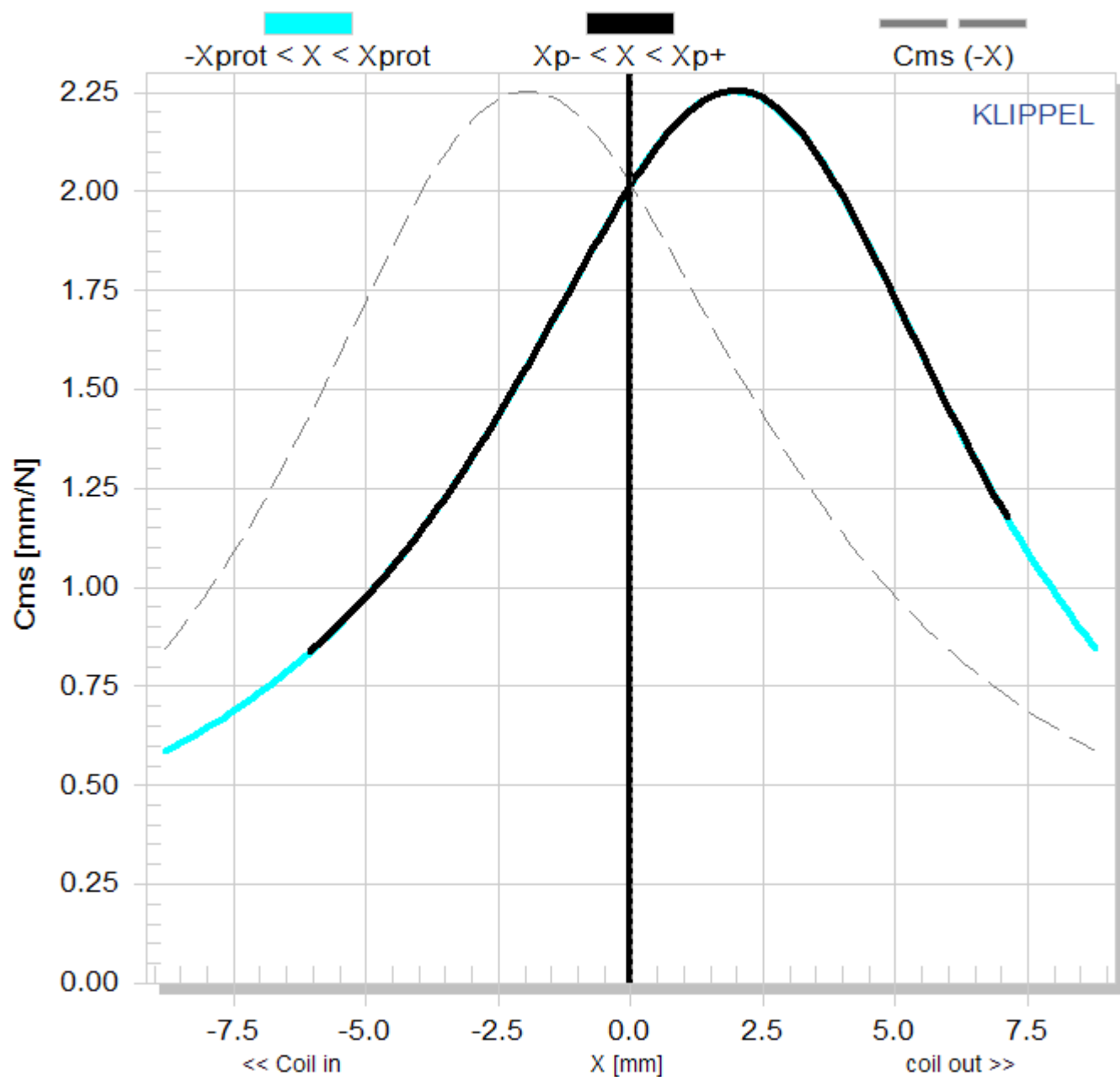
Force factor BI (X)

(00:15:32)



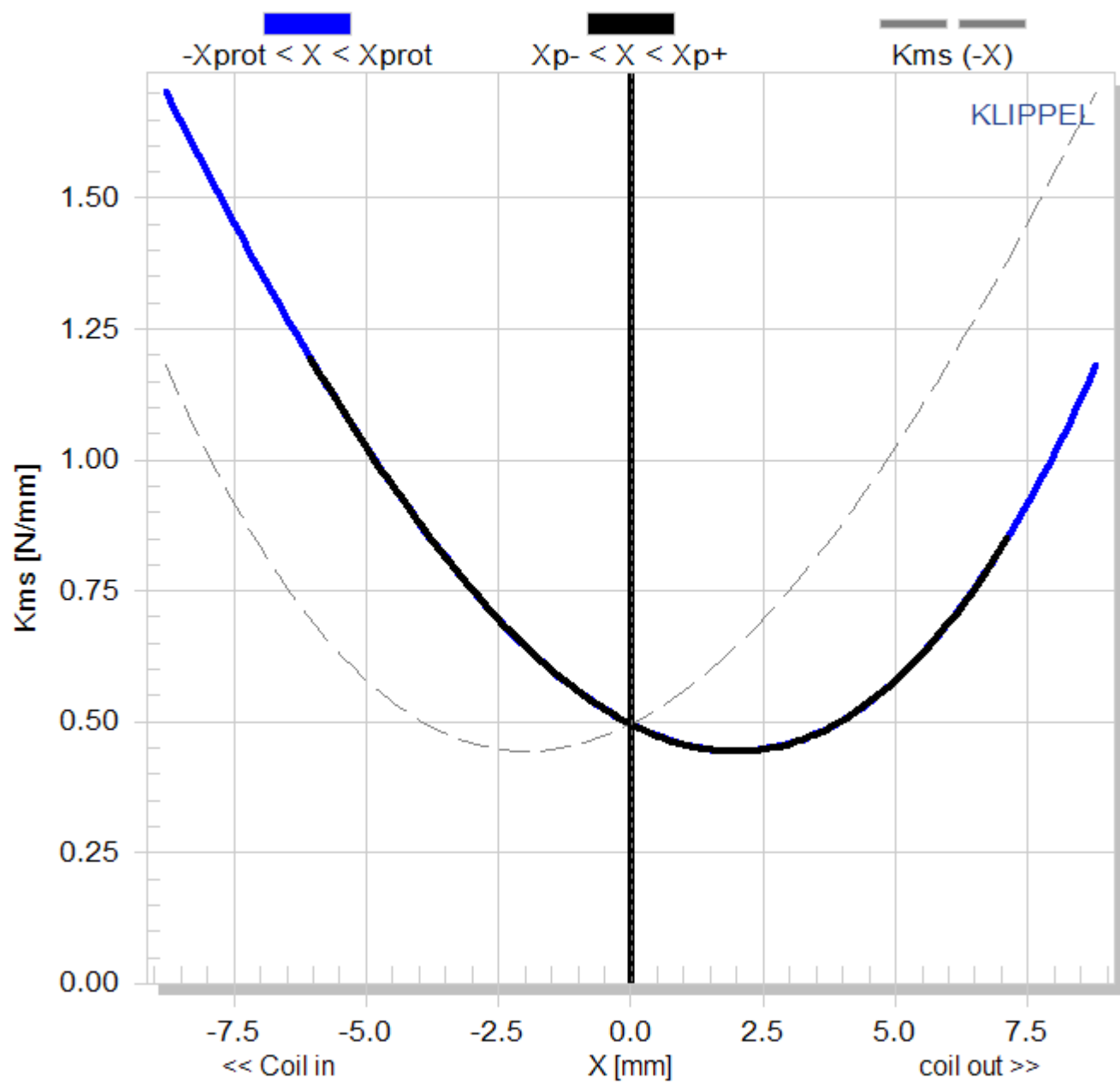
Mechanical compliance Cms (X)

(00:15:32)




Stiffness of suspension $K_{ms}(X)$


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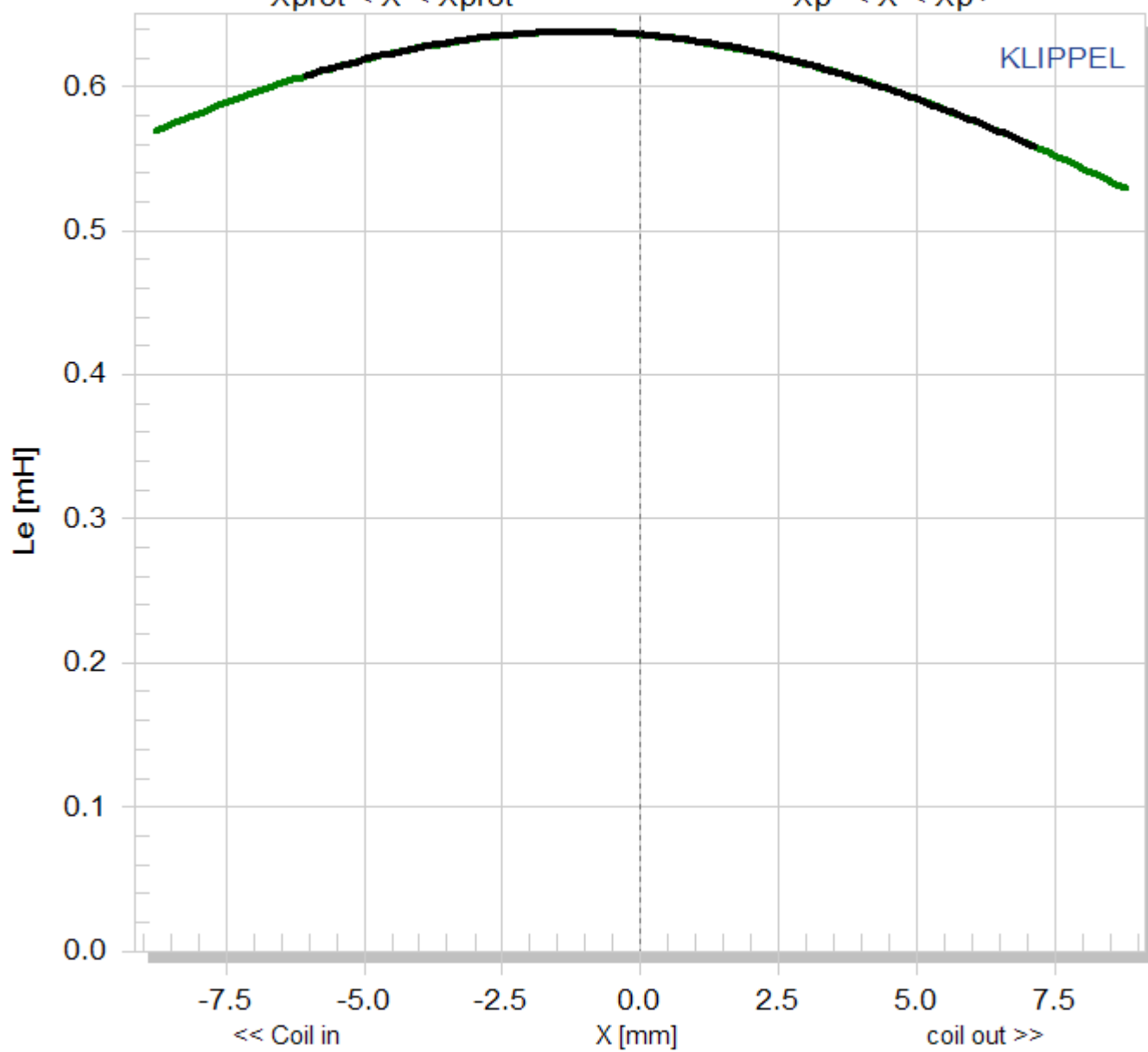


Electrical inductance $L(X, I=0)$

(00:15:32)

 $-X_{\text{prot}} < X < X_{\text{prot}}$

 $X_{p-} < X < X_{p+}$



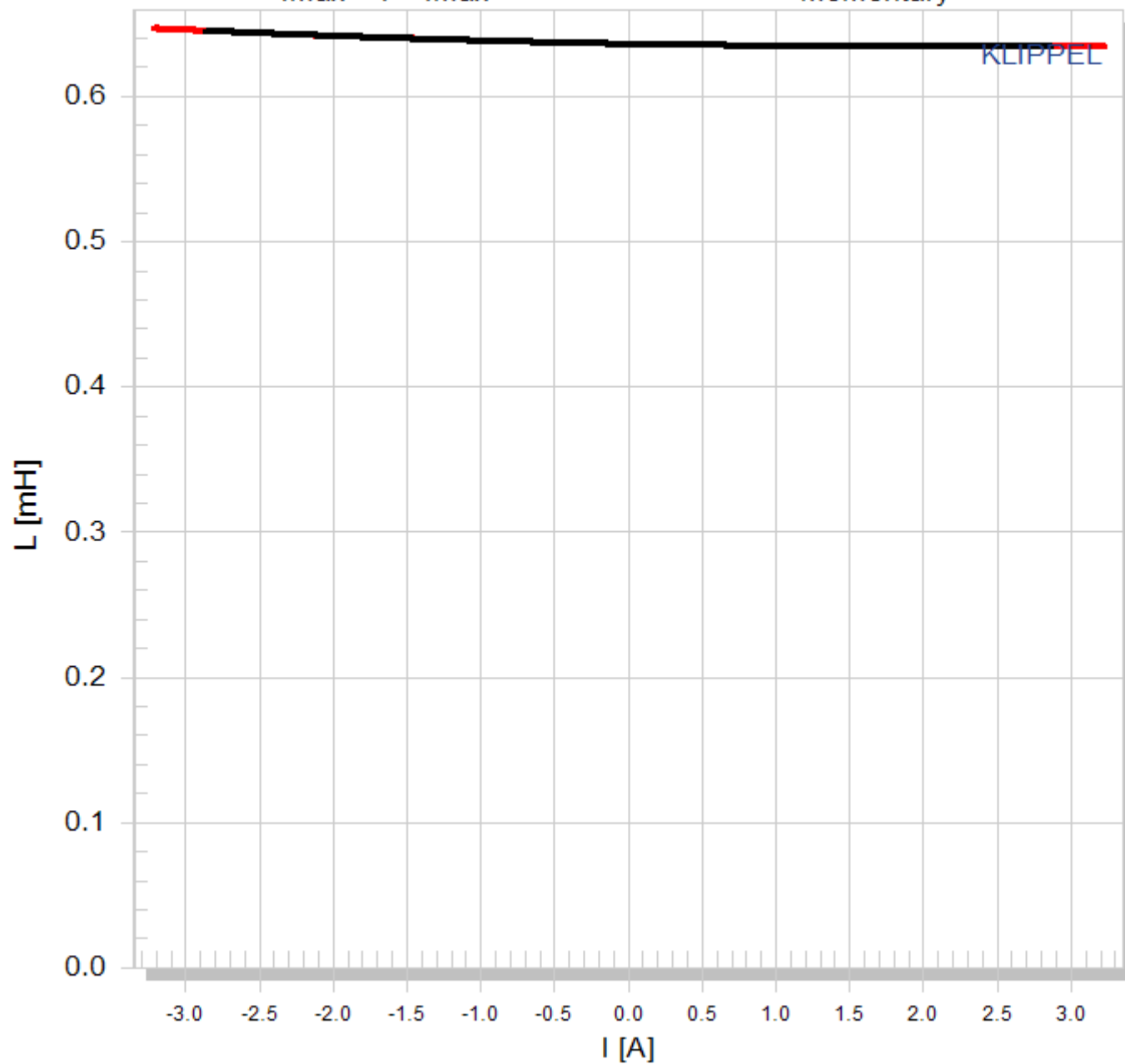
Inductance over current $L(X=0, I)$



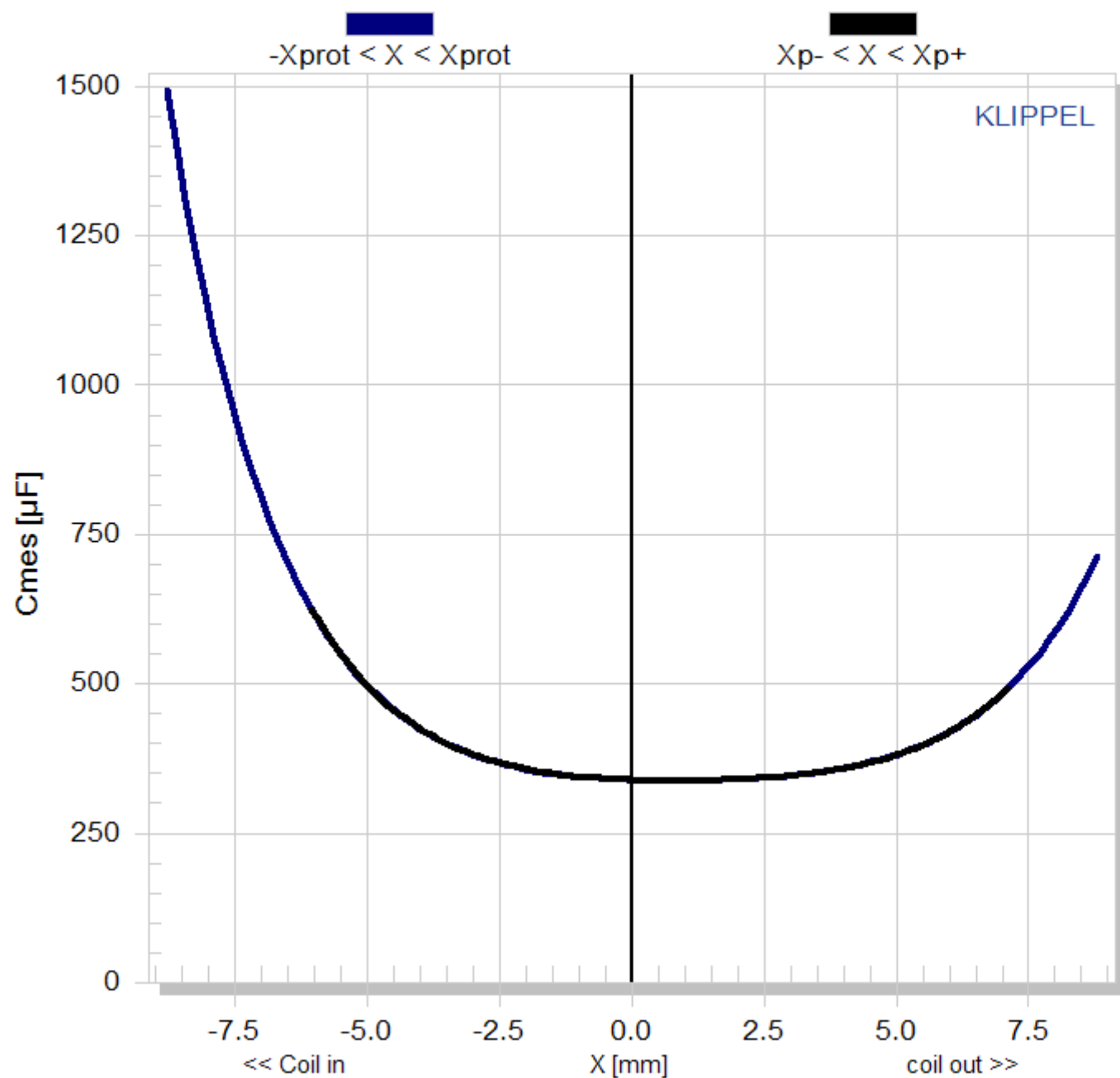
$-I_{\max} < I < I_{\max}$



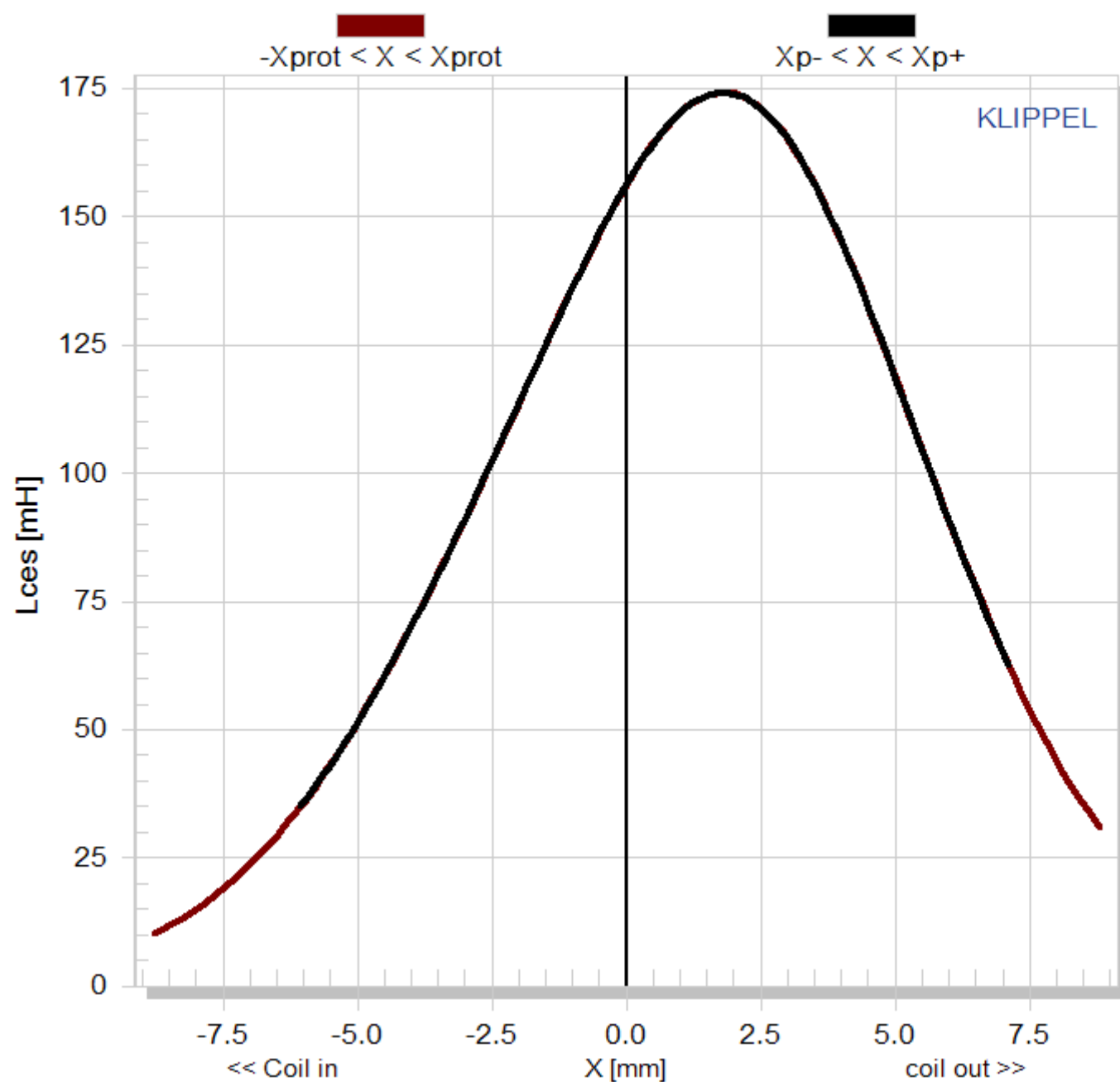
momentary



Capacitance $C_{mes}(X)$ corresponds to driver mass (00:15:32)

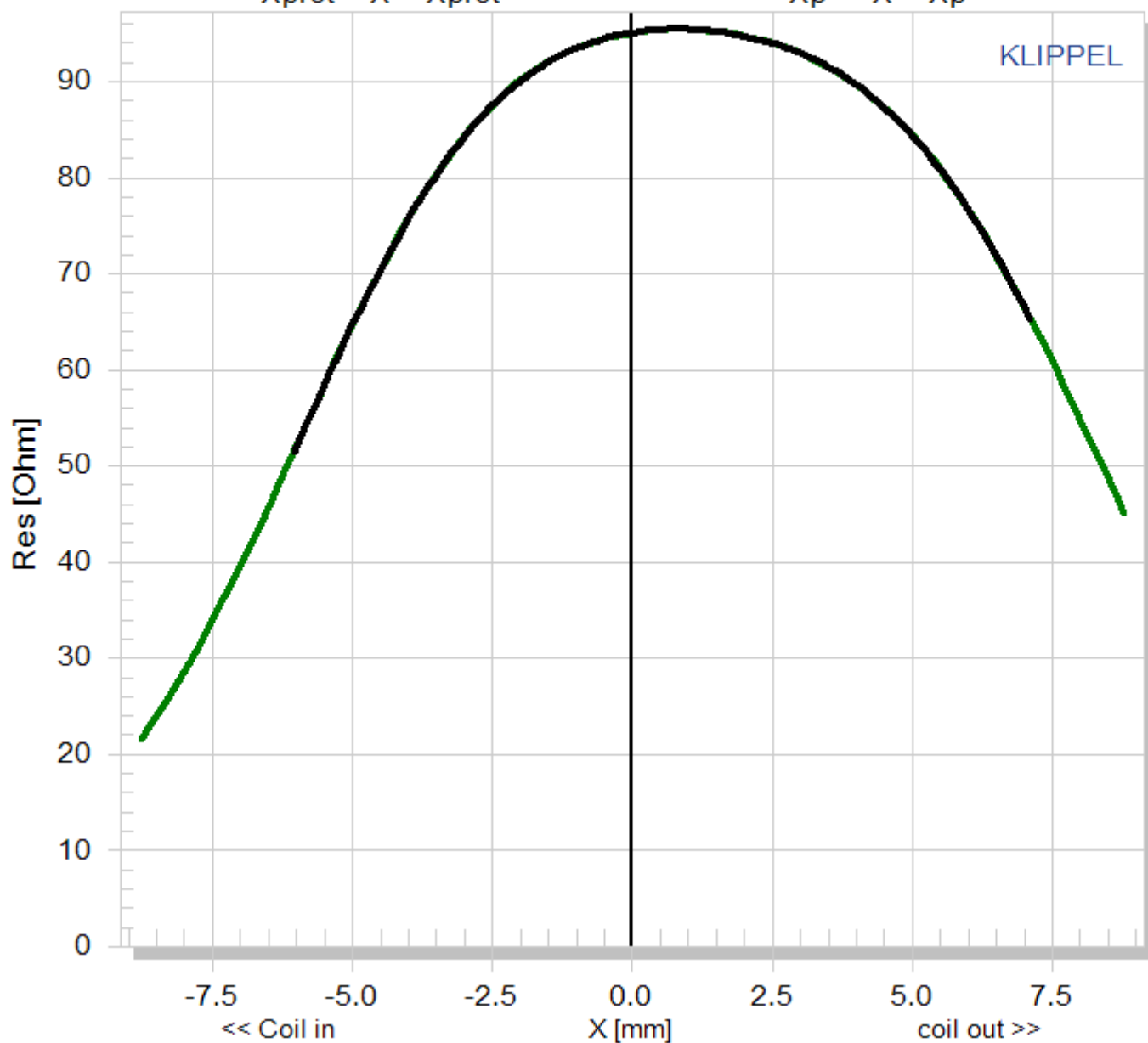


Inductance L_{ces} (X) corresponds to suspension compliance (00:15:32)



Resistance Res (X) corresponds to suspension resistance (00:15:32)

$-X_{prot} < X < X_{prot}$ $X_{p-} < X < X_{p+}$

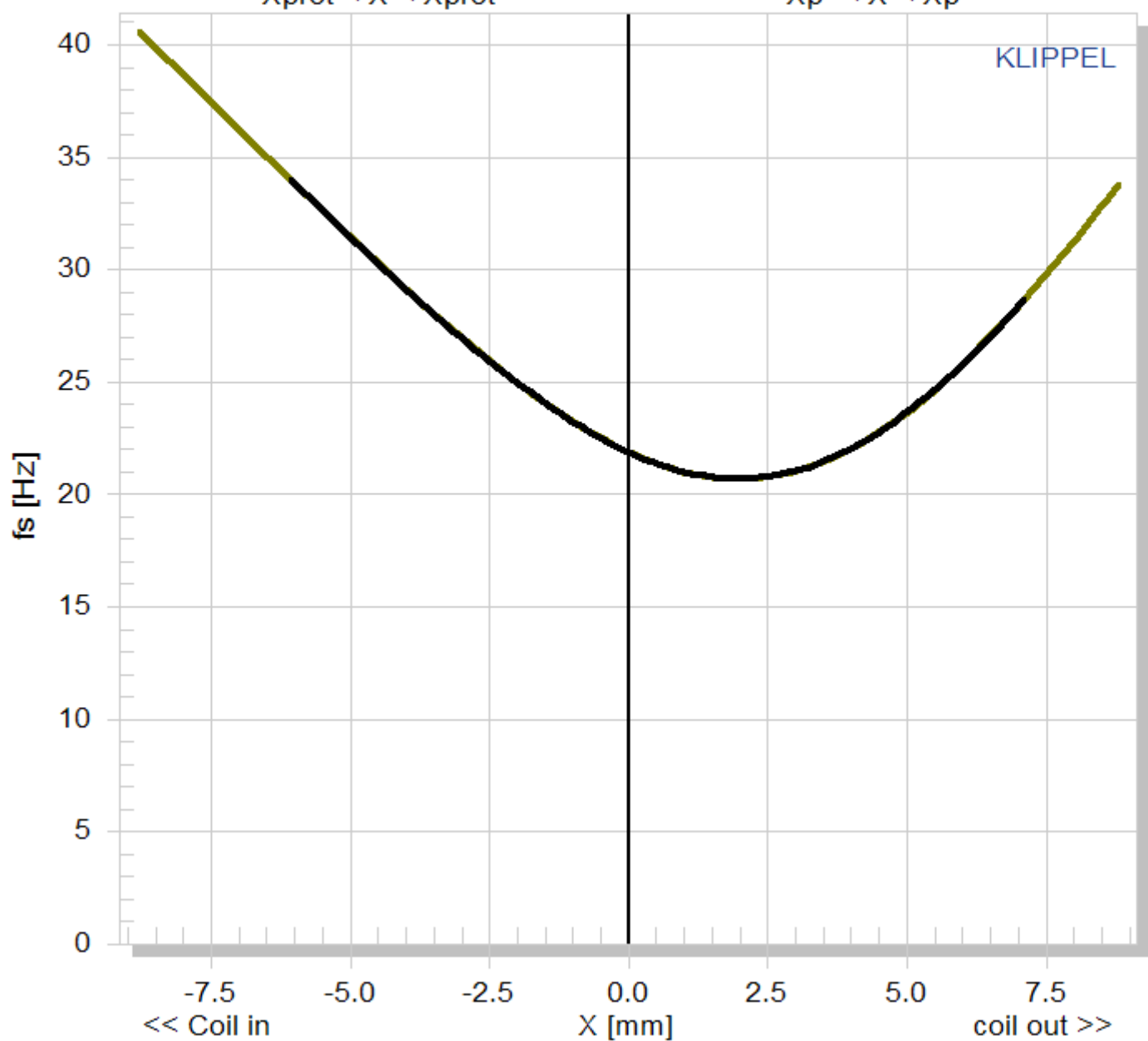


Resonance frequency f_s (X)

(00:15:32)


$-X_{\text{prot}} < X < X_{\text{prot}}$


$X_{\text{p-}} < X < X_{\text{p+}}$

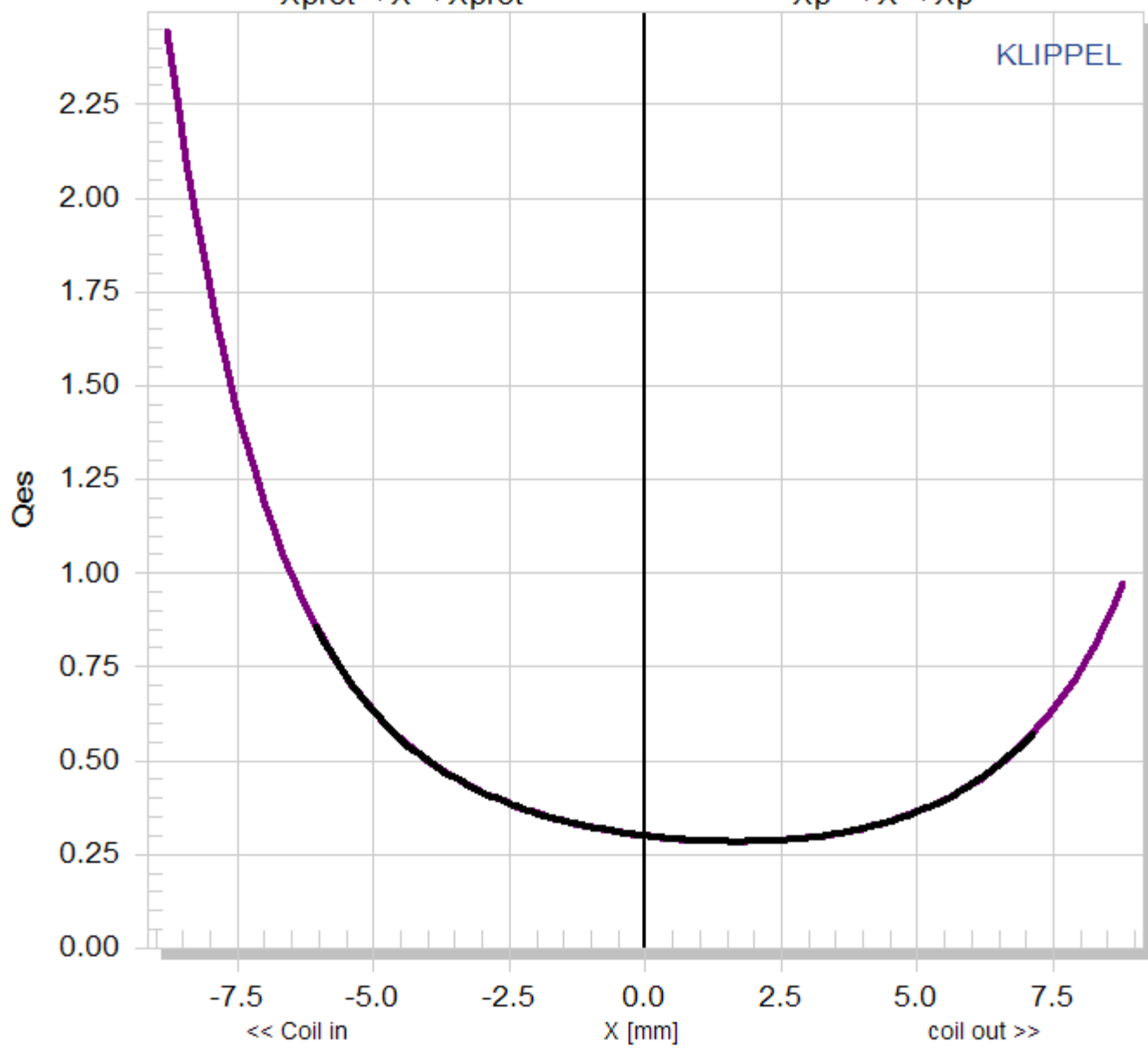


Electrical loss factor Qes (X)

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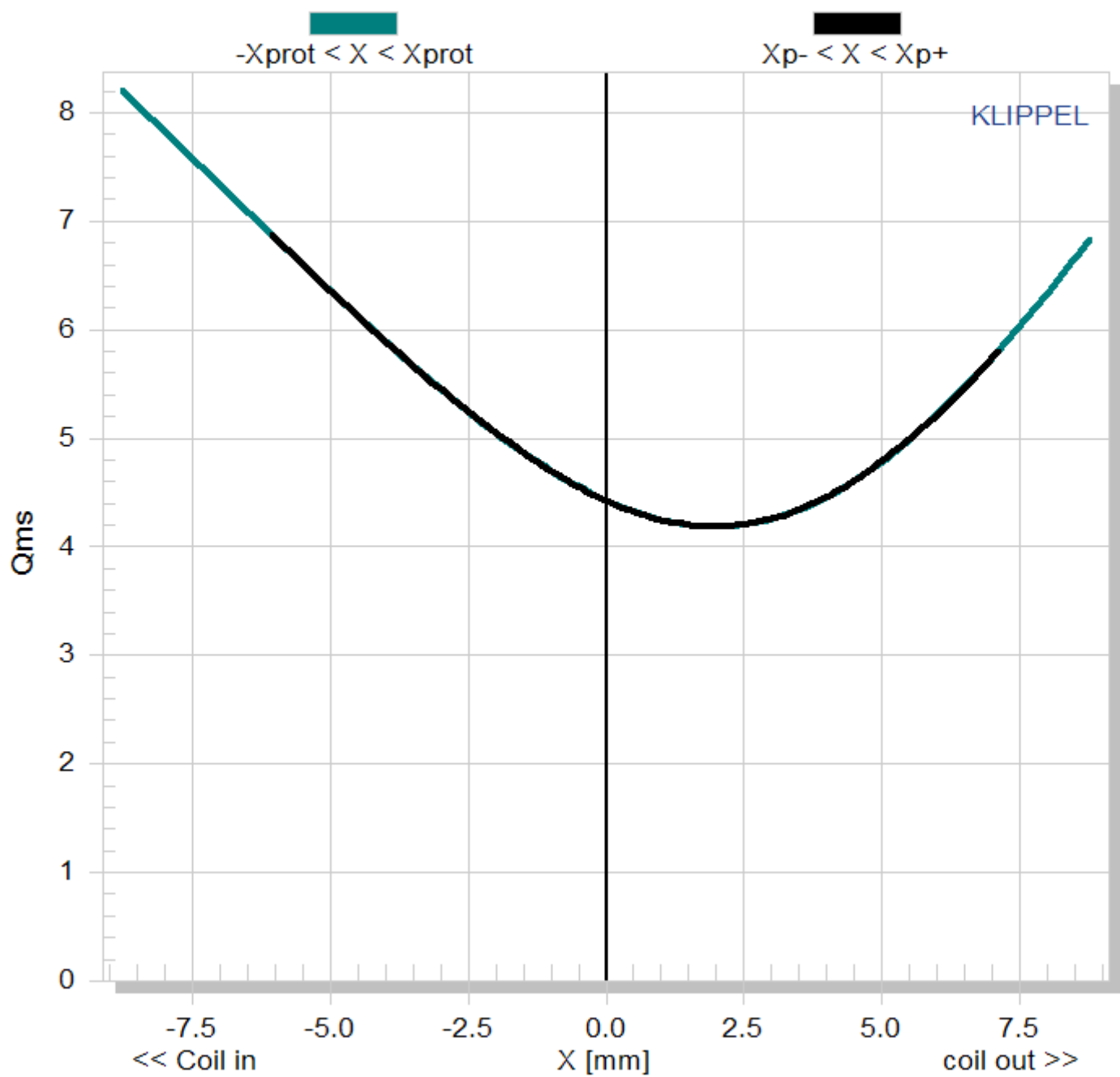
 $-X_{prot} < X < X_{prot}$

 $X_{p-} < X < X_{p+}$



Mechanical loss factor $Q_{ms}(X)$

(00:15:32)

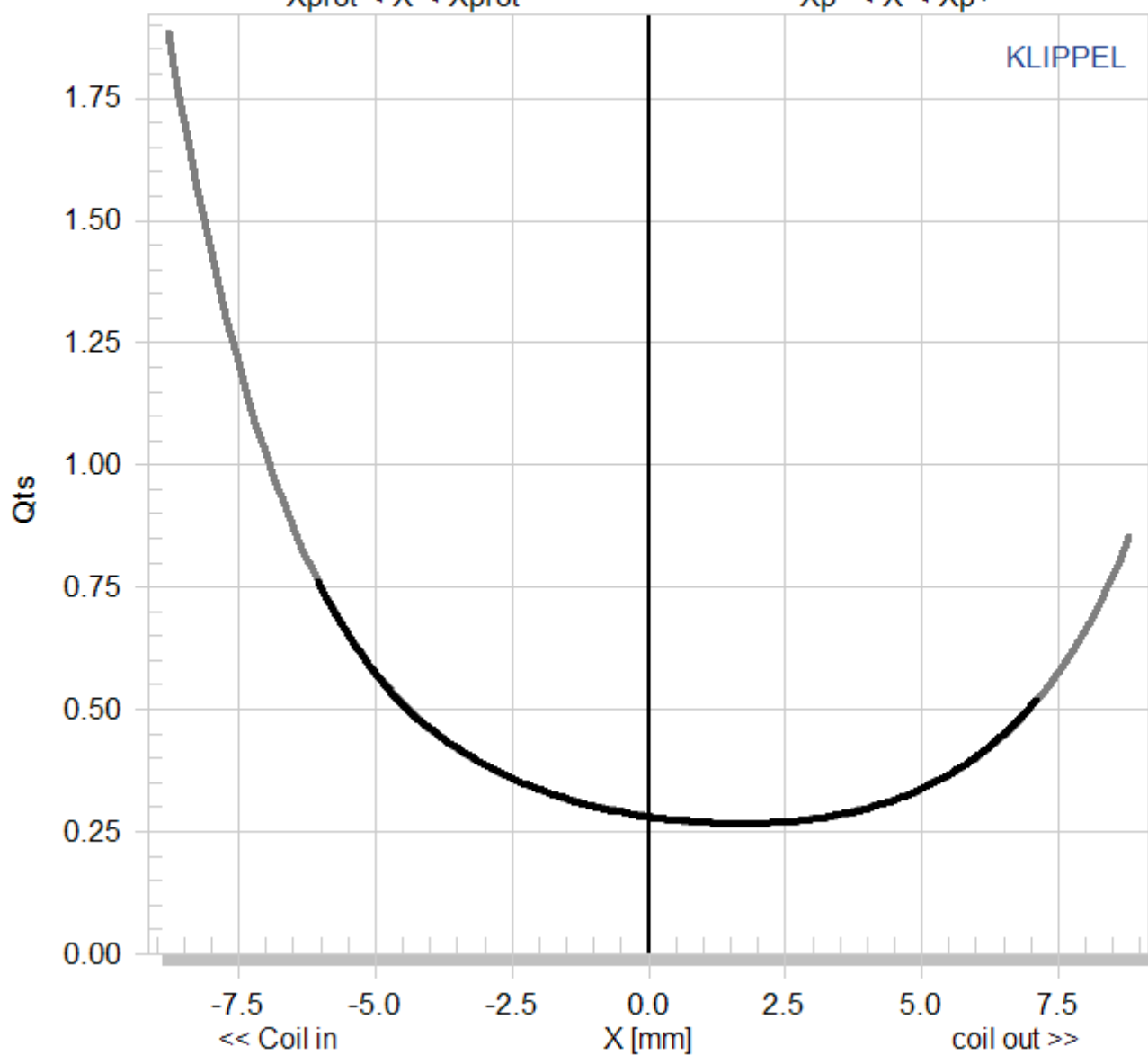


Total loss factor Qts (X)

(00:15:32)

$-X_{prot} < X < X_{prot}$

$X_{p-} < X < X_{p+}$



BI Symmetry Range



Symmetry Point

KLIPPEL

Coil out >

Offset

<< Coil in

7.5

5.0

2.5

0.0

-2.5

-5.0

-7.5

0

1

2

3

4

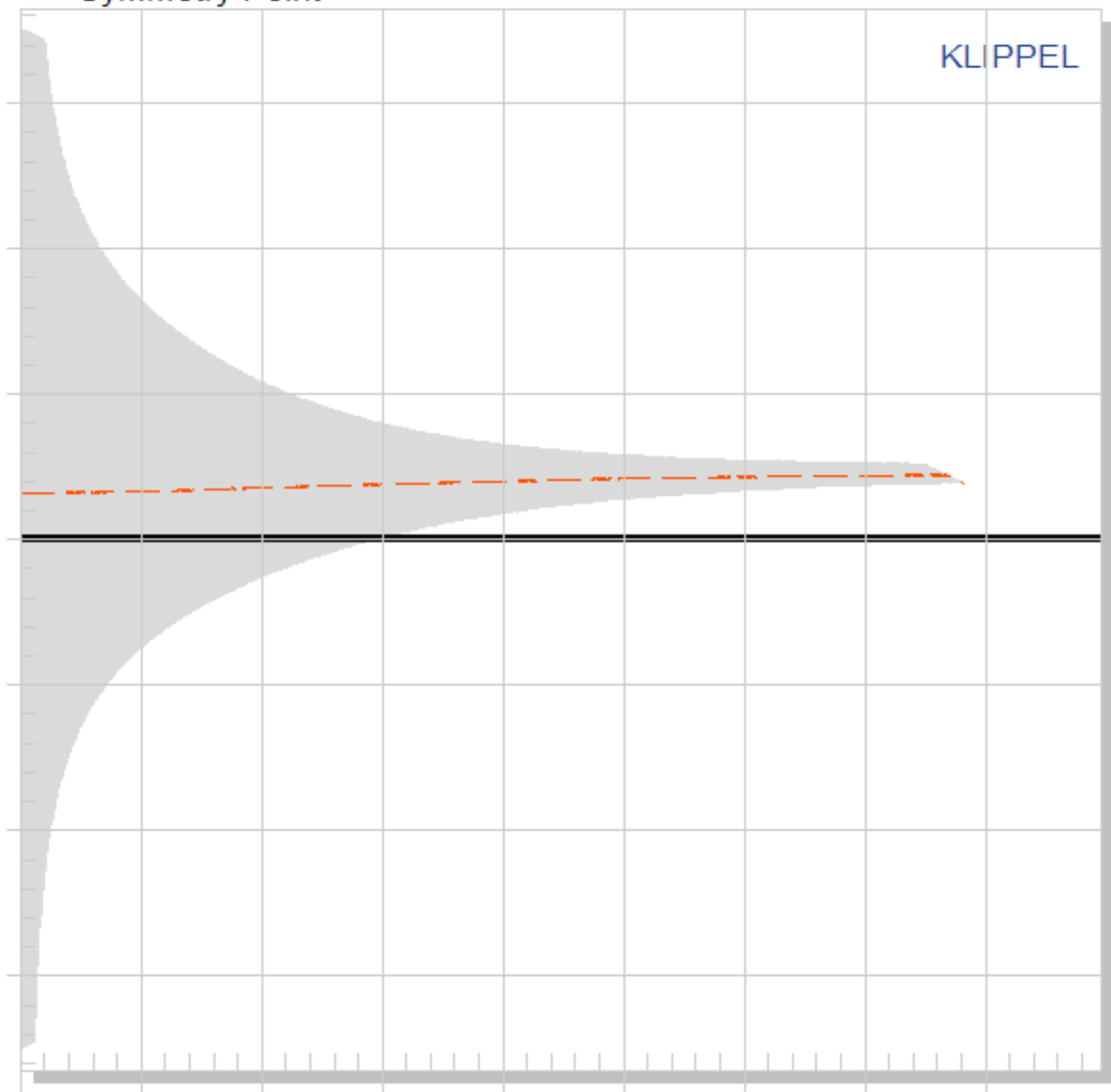
5

6

7

8

Amplitude [mm]



Kms Symmetry Range

Symmetry Point

KLIPPEL

Coil out >>

Offset

<< Coil in

Amplitude [mm]

7.5

5.0

2.5

0.0

-2.5

-5.0

-7.5

0

1

2

3

4

5

6

7

8

Symbol	Number	Unit	Comment
Displacement Limits			thresholds can be changed in Processing property page
X Bl @ Bl min=82%	5.1	mm	Displacement limit due to force factor variation
X C @ C min=75%	2.2	mm	Displacement limit due to compliance variation
X L @ Z max=10 %	>6.0	mm	Displacement limit due to inductance variation
X d @ d2=10%	41.4	mm	Displacement limit due to IM distortion (Doppler)
alpha			Heating of voice coil by eddy currents
alphaOrg			Heating of voice coil by eddy currents (without limits)
Rtv		K/W	thermal resistance coil ==> pole tips
rv		Ws/Km	air convection cooling depending on velocity
Rtm		K/W	thermal resistance magnet ==> environment
tau m		min	thermal time constant of magnet
Ctm		Ws/K	thermal capacity of the magnet
tau v		s	thermal time constant of voice coil
Ctv		Ws/K	thermal capacity of the voice coil
delta Tw		K	Temperature increase in Warm Resistance Mode
delta Tc		K	Temperature increase in Convection Mode
delta Te		K	Temperature increase in Eddy Mode
Pcoil(warm)		W	Pcoil in warm mode
Pcoil(conv)		W	Pcoil in convection mode
Ptv(mag.beg)		W	power heating the coil at beginning of magnet mode
Ptv(mag.mid)		W	power heating the coil sampled in the middle of magnet mode
Ptv(mag.end)		W	power heating the coil at end of magnet mode
Ptm(mag.beg)		W	power heating the magnet at beginning of magnet mode
Ptm(mag.mid)		W	power heating the magnet sampled in the middle of magnet mode
Ptm(mag.end)		W	power heating the magnet at end of magnet mode
f1	-0.002907	1/A	coefficient (1) of Inductance over current (flux modulation)
f2	0.000718	1/A^2	coefficient (2) of Inductance over current (flux modulation)
Bl0 = Bl (X=0)	9.0882	N/A	constant part in force factor
Bl1	0.090165	N/Amm	1st order coefficient in force factor expansion
Bl2	-0.044828	N/Amm^2	2nd order coefficient in force factor expansion
Bl3	0.00045624	N/Amm^3	3rd order coefficient in force factor expansion
Bl4	-5.8535e-005	N/Amm^4	4th order coefficient in force factor expansion
Bl5		N/Amm^5	5th order coefficient in force factor expansion

Bl6		N/Amm ⁶	6th order coefficient in force factor expansion
Bl7		N/Amm ⁷	7th order coefficient in force factor expansion
Bl8		N/Amm ⁸	8th order coefficient in force factor expansion
L0 = Le (X=0)	0.63593	mH	constant part in inductance
L1	-0.0030063	mH/mm	1st order coefficient in inductance expansion
L2	-0.0012896	mH/mm ²	2nd order coefficient in inductance expansion
L3	1.0010e-005	mH/mm ³	3rd order coefficient in inductance expansion
L4	2.2078e-006	mH/mm ⁴	4th order coefficient in inductance expansion
L5		mH/mm ⁵	5th order coefficient in inductance expansion
L6		mH/mm ⁶	6th order coefficient in inductance expansion
L7		mH/mm ⁷	7th order coefficient in inductance expansion
L8		mH/mm ⁸	8th order coefficient in inductance expansion
C0 = Cms (X=0)	2.0002	mm/N	constant part in compliance
C1	0.12987	1/N	1st order coefficient in compliance expansion
C2	-0.027743	1/Nmm	2nd order coefficient in compliance expansion
C3	-0.0017887	1/Nmm ²	3rd order coefficient in compliance expansion
C4	0.00012543	1/Nmm ³	4th order coefficient in compliance expansion
C5		1/Nmm ⁴	5th order coefficient in compliance expansion
C6		1/Nmm ⁵	6th order coefficient in compliance expansion
C7		1/Nmm ⁶	7th order coefficient in compliance expansion
C8		1/Nmm ⁷	8th order coefficient in compliance expansion
K0 = Kms (X=0)		N/mm	constant part in stiffness
K1	-0.051645	N/mm ²	1st order coefficient in stiffness expansion
K2	0.012248	N/mm ³	2nd order coefficient in stiffness expansion
K3	0.00028391	N/mm ⁴	3rd order coefficient in stiffness expansion
K4	3.7517e-007	N/mm ⁵	4th order coefficient in stiffness expansion
Xpse	8.8	mm	-Xpse < X < Xpse, range where power series is fitted

Symbol	Large + Warm	Large + Cold	Small Signal	Unit	Comment
Note:					for accurate small signal parameters, use LPM module
Delta Tv = Tv-Ta	22	0	0	K	increase of voice coil temperature during the measurement
Xprot	8.8	8.8	3.2	mm	maximal voice coil excursion (limited by protection

					system)
Re (Tv)	6.77	6.25	6.25	Ohm	(imported) voice coil resistance considering increase of voice coil temperature Tv
Le (X=0)	0.64	0.64	0.54	mH	voice coil inductance at the rest position of the voice coil
L2 (X=0)	1.82	1.82	1.01	mH	para-inductance at the rest position due to the effect of eddy current
R2 (X=0)	2.30	2.30	2.30	Ohm	resistance at the rest position due to eddy currents
Cmes (X=0)	338	338	339	μF	electrical capacitance representing moving mass
Lces (X=0)	156.31	156.31	137.00	mH	electrical inductance at the rest position representing driver compliance
Res (X=0)	95.09	95.09	44.18	Ohm	resistance at the rest position due to mechanical losses
Qms (X=0, Tv)	4.43	4.43	2.20		mechanical Q-factor considering Rms only
Qes (Tv)	0.30	0.28	0.29		electrical Q-factor considering Re (Tv) only
Qts (X=0, Tv)	0.28	0.26	0.26		total Q-factor considering Re (Tv) and Rms only
fs	21.9	21.9	23.4	Hz	driver resonance frequency
Mms	26.216	26.216	26.216	g	(imported) mechanical mass of driver diaphragm assembly including voice-coil and air load
Rms (X=0)	0.814	0.814	1.753	kg/s	mechanical resistance of total-driver losses
Cms (X=0)	2.02	2.02	1.77	mm/N	mechanical compliance of driver suspension at the rest position
Bl (X=0)	9.03	9.03	9.03	N/A	(imported) force factor at the rest position (Bl product)
Vas	122.3968	122.3968	107.2946	l	equivalent air volume of suspension
N0	0.411	0.445	0.445	%	reference efficiency (2Pi-sr radiation using Re)
Lm	88.3	88.6	88.6	dB	characteristic sound pressure level
Sd	207.39	207.39	207.39	cm²	diaphragm area

Symbol	Value	Unit	Comment
Date	2011-06-25		
Time	08:28:24		
Serial number	302		
Mode	Nonlinear Mode 5(7)		

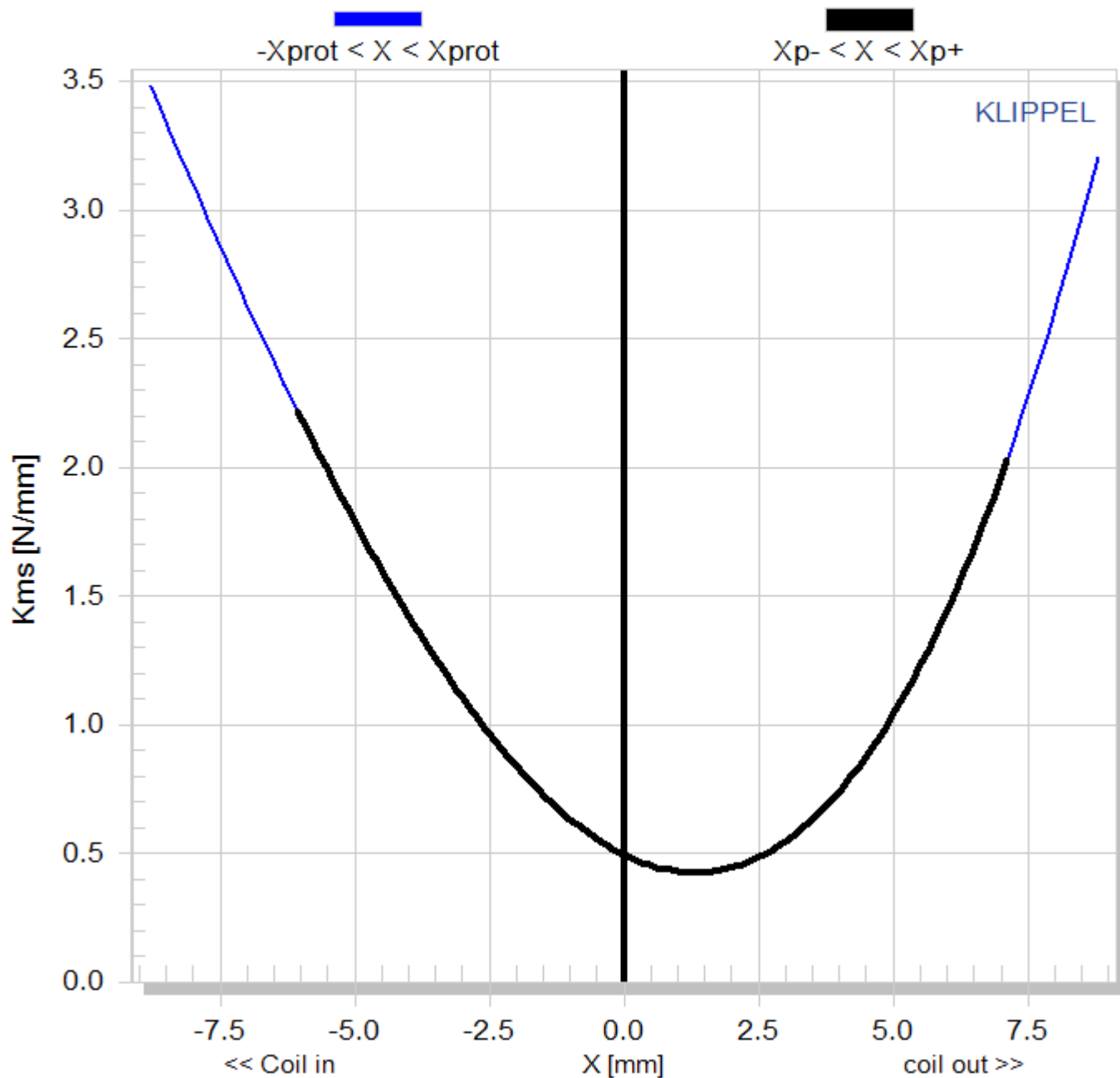
Record	368/368		
Laser	signal reliable		
t	00:15:32	h:min:s	measurement time
Time remaining	00:04:28	h:min:s	recalculated at thermal mode(a)
Ei (t)	5.3	%	error current measurement
Ex (t)	50.0	%	error laser measurement
Eu (t)	9.4	%	error amplifier check
Delta Tv (Delta Tlim)	21.9 (100.0)	K	increase of voice coil temperature (limit)
Blmin (Bllim)	49.8 (50.0)	%	minimal force factor ratio (limit)
Cmin (Clim)	29.9 (28.0)	%	minimal compliance ratio (limit)
P (Plim)	6.4391 (50.00)	W	real electrical input power (limit)
Lmin	83.9	%	minimal inductance ratio
Pn	8.200834	W	nominal electrical input power
P Re	5.606428	W	Power heating voice coil
Irms	0.910	A	rms value of the electrical input current
Urms	8.100	V	rms value of the electrical voltage at the transducer terminals
Ipeak	2.866	A	peak value of the electrical input current
Upeak	29.590	V	peak value of the electrical voltage at the transducer terminals
PC	0.69	dB	thermal power compression factor
Glarge (Gmax)	10.5 (26.0)	dB	gain of the excitation amplitude increased in the large signal domain (maximum)
Mech. system		abs.	import used to identify mechanical system in absolute quantities
Xdc	0.4	mm	dc component of voice coil excursion measured in the last update intervall
Xpeak	6.6	mm	positive peak value of voice coil excursion measured in the last update intervall
Xbottom	-6.9	mm	negative peak value (bottom) of voice coil excursion measured in the last update intervall
Xp+	7.1	mm	upper limit of displacement range (99% probability)
Xp-	-6.1	mm	lower limit of displacement range (99% probability)
Xprot	8.8	mm	maximal voice coil excursion allowed by protection system
v rms	0.43	m/s	voice coil velocity
Db	17.6	%	distortion factors representing contribution of nonlinear force factor
DI	1.4	%	distortion factor representing contribution of nonlinear inductance
Dc	15.3	%	distortion factor representing contribution of nonlinear compliance

R th total	3.90	K/W	Delta Tv / P Re

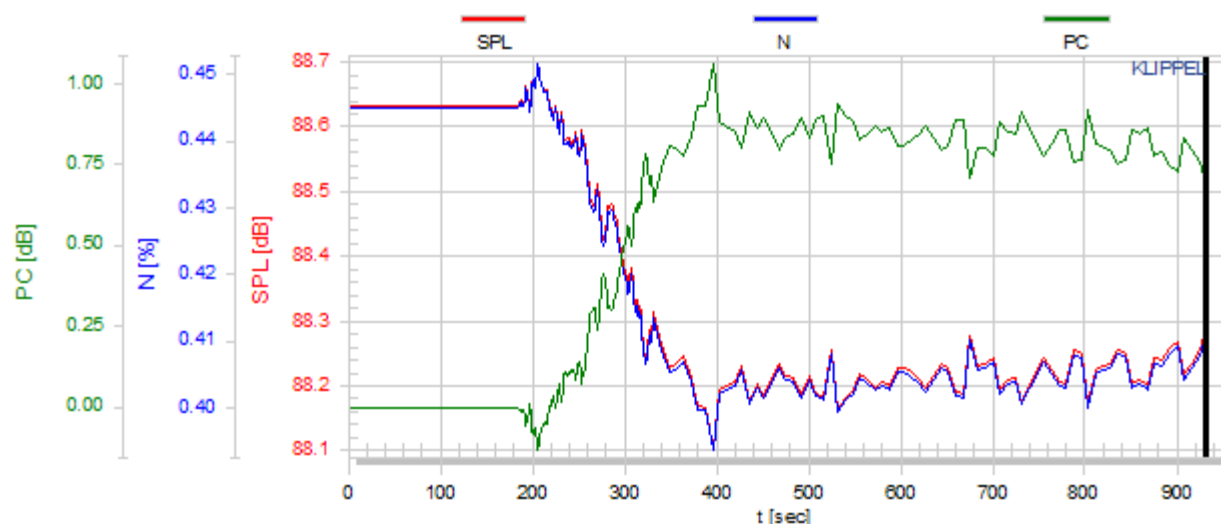
Symbol	Number	Unit	Comment
Generator (Property Page)			
Spectral characteristic	automatic:pink		
fhp	10	Hz	cut-off frequency of high pass (-3 dB)
flp	400	Hz	cut-off frequency of low pass (-3 dB)
Protection (Property Page)			
Delta Tlim	100	K	increase of voice coil temperature (limit)
Bllim	50.0	%	minimal force factor ratio (limit)
Clim	28.0	%	minimal compliance ratio (limit)
Plim	50.00	W	electrical input power (limit)
Gsmall	-16.0	dB	small-signal gain
Conditions (Property Page)			
Finish after step of	not activated		
Duration of 'Nonlinear Mode 5(7)'	10	min	
Speaker	1		

Incremental Stiffness $K_{incr}(X)$

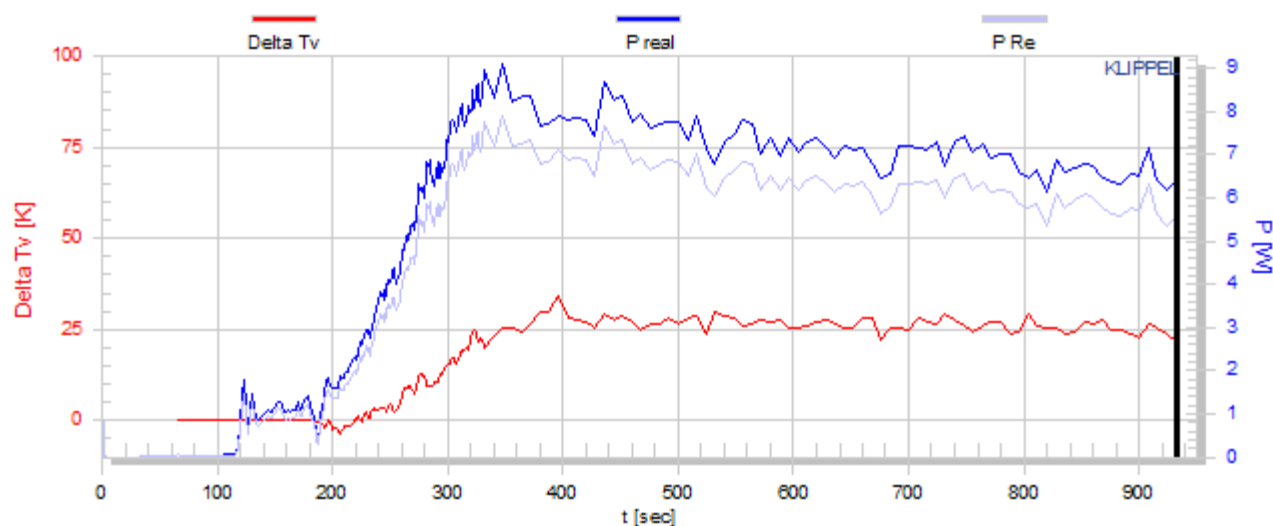
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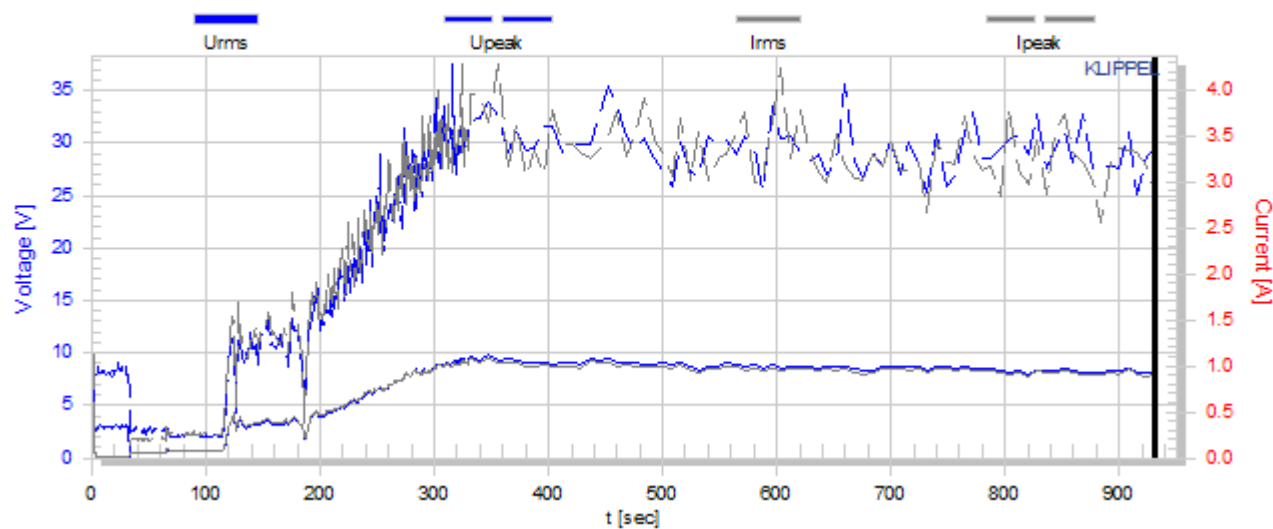
Sound pressure level SPL (t), efficiency N (t) and thermal power compression PC (t)
(00:15:32)



Increase of voice coil temperature Delta Tv (t) and electrical input power P (t)
(00:15:32)

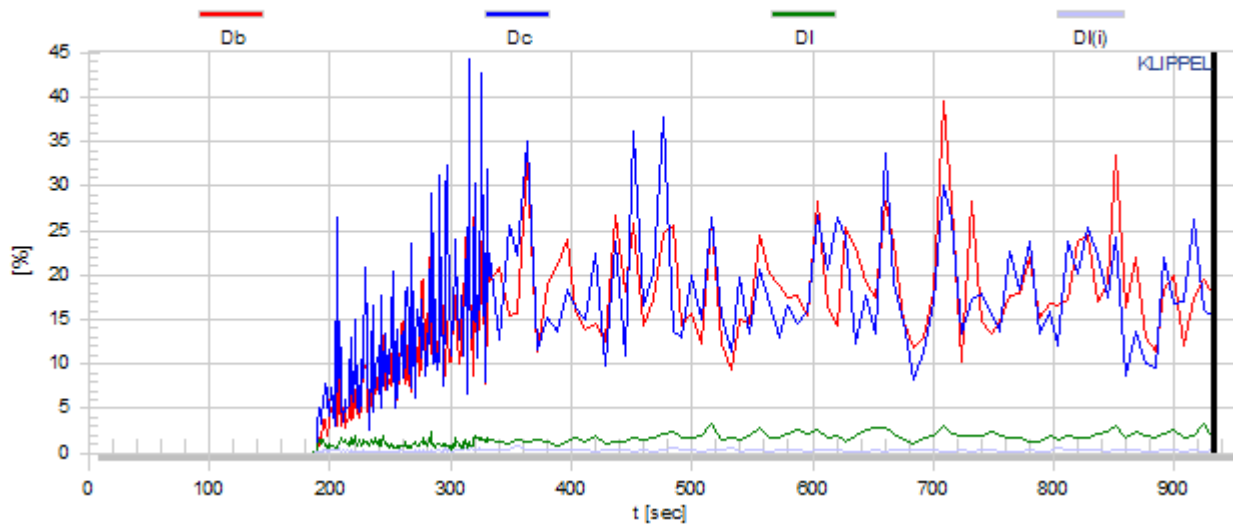


Voltage Urms, Upeak (t) and current Irms, Ipeak (t)
(00:15:32)



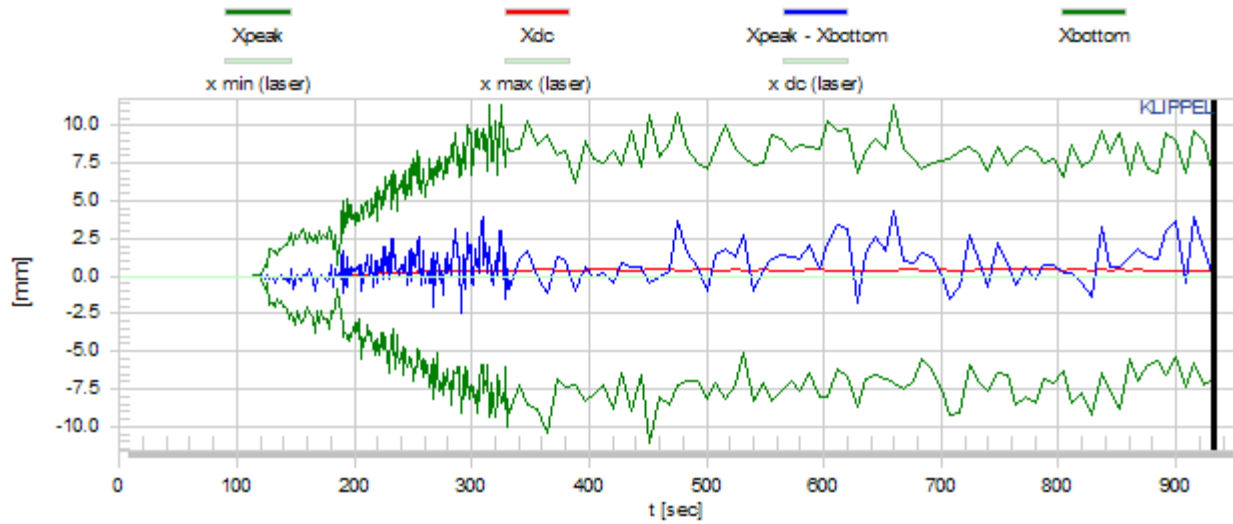
Distortion analysis : Db (BI-product), Dc (suspension), DI (inductance)

(00:15:32)



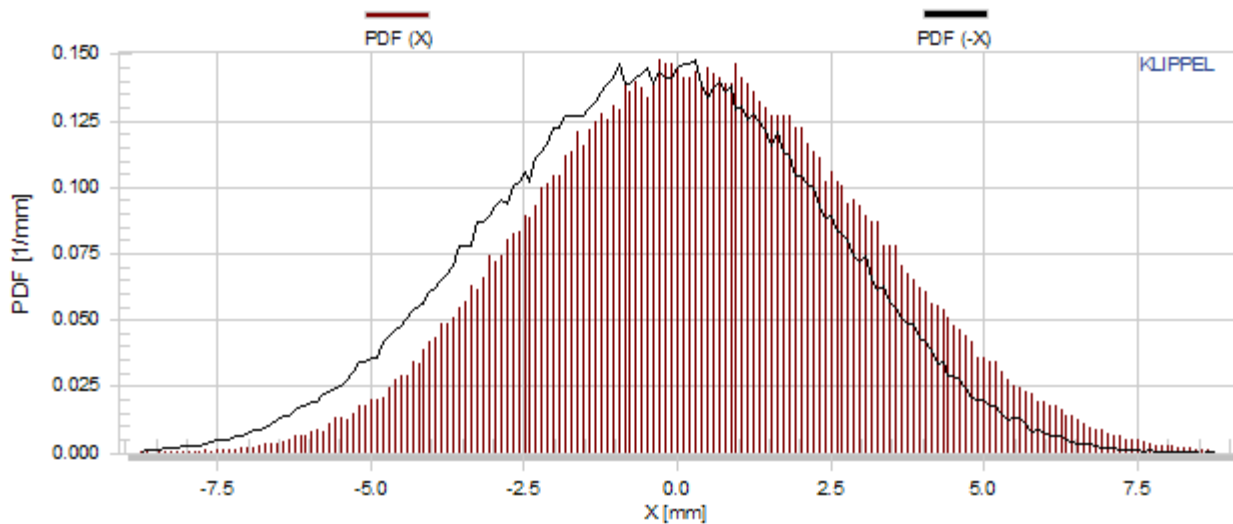
Voice coil displacement

(00:15:32)



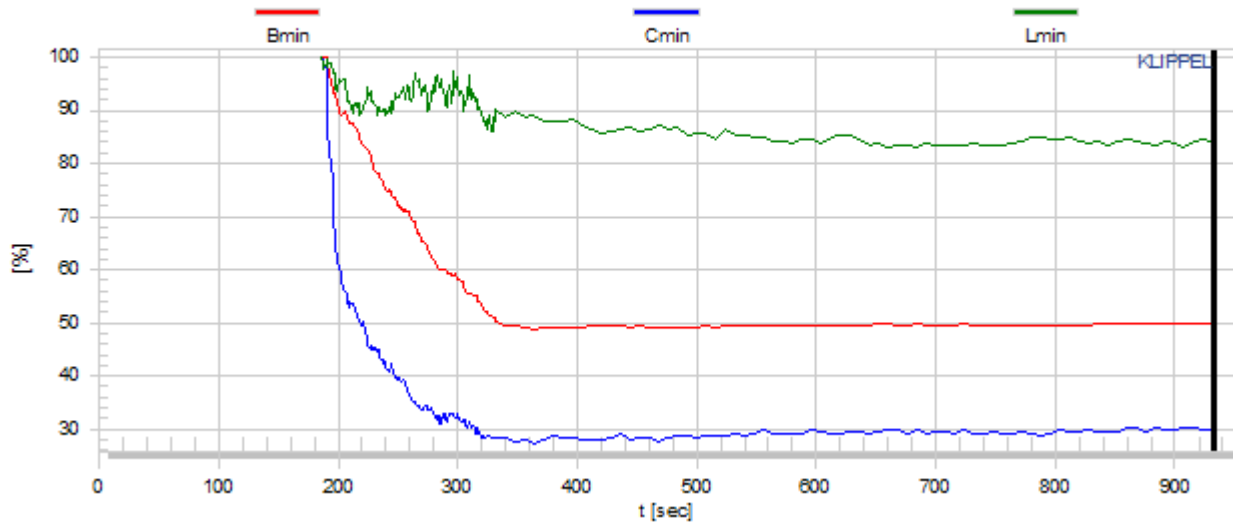
Displacement PDF (X) histogram

(00:15:32)



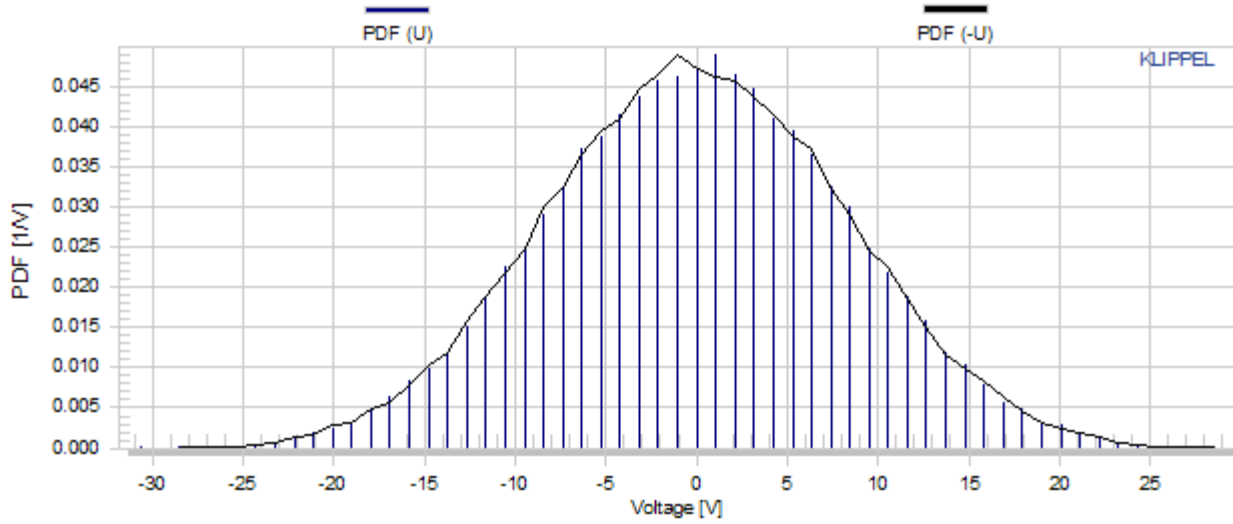
Minimal parameter values

(00:15:32)



Voltage PDF (U) histogram

(00:15:32)



- End