An investigation of the screen grid tap

A search for the hidden arguments.

By Rudolf Moers

APPENDICES

Mentioned screen grid taps x_{TURNS} in these appendices are the values from column 3 of table 7.

For all anode characteristics in appendix A, C and E, the V_{g1k}-curves in the intervals $0V \leq V_{ak} \leq 300V$ are measured with the µTracer and the V_{g1k}-curves in the intervals $300V \leq V_{ak} \leq 600V$ are extrapolated, so not measured.
By this 5 or 4 points of intersection on the load line are made with measured V_{g1k}-curves and the other 3 or 4 points of intersection on the load line are made with extrapolated V_{g1k}-curves.

A. Measured with the µTracer and extrapolated anode characteristics of EL84 for several screen grid taps. Load line for EL84 goes through working point $V_{ak,w}$ = 300V, $I_{a,w}$ = 40mA and $V_{g1k,w} \approx -9.1V$.

B. Constructed dynamic transconductance characteristics of EL84 for several screen grid taps.

C. Measured with the µTracer and extrapolated anode characteristics of EL34 for several screen grid taps. Load line for EL34 goes through working point $V_{ak,w}$ = 300V, $I_{a,w}$ = 80mA and $V_{g1k,w} \approx -16.1V$.

D. Constructed dynamic transconductance characteristics of EL34 for several screen grid taps.

E. Measured with the µTracer and extrapolated anode characteristics of KT88 for several screen grid taps. Load line for KT88 goes through working point $V_{ak,w}$ = 300V, $I_{a,w}$ = 80mA and $V_{g1k,w} \approx -26.4V$.

F. Constructed dynamic transconductance characteristics of KT88 for several screen grid taps.

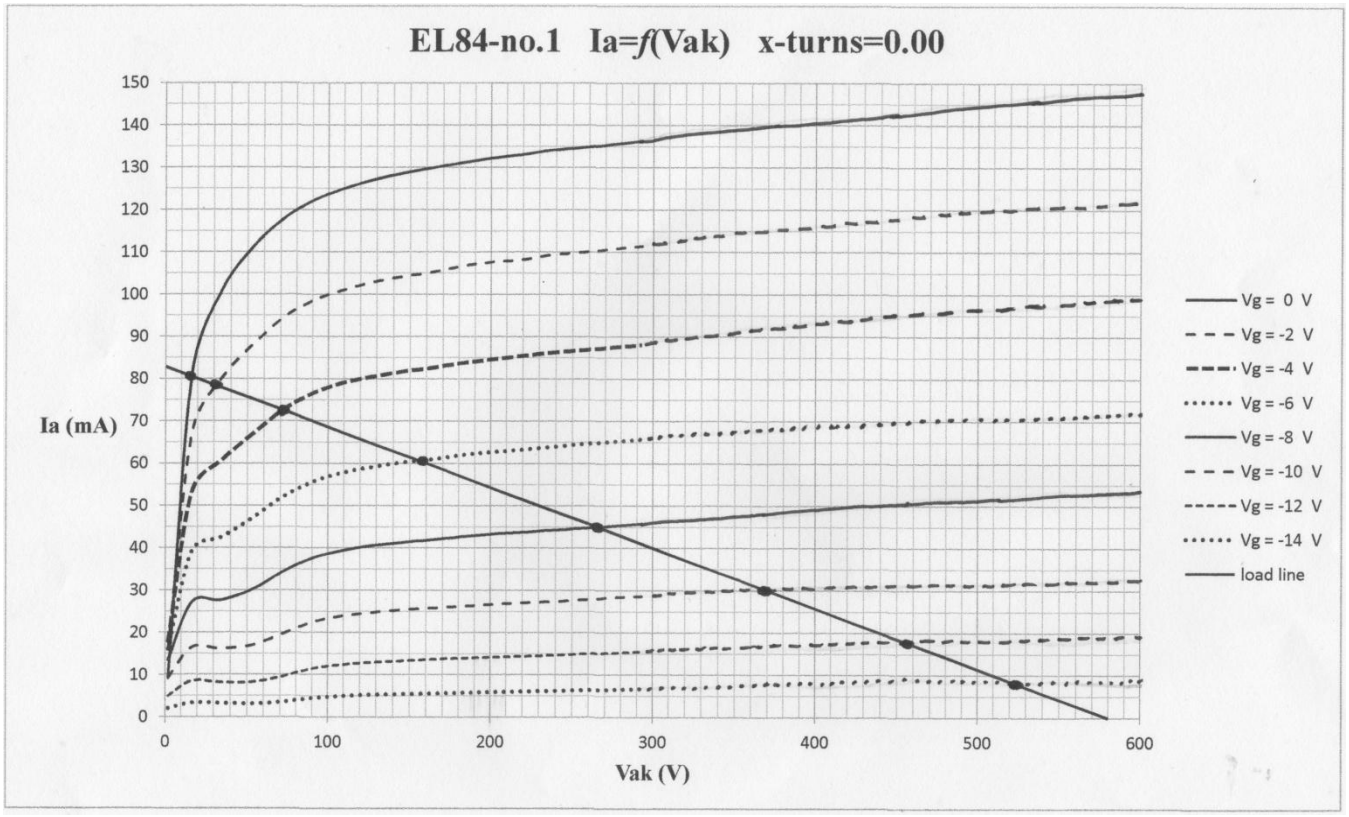
The constructed dynamic transconductances of appendix B are derived from the anode characteristics of appendix A (see the points of intersection of the V_{g1k}-curves with the load lines).

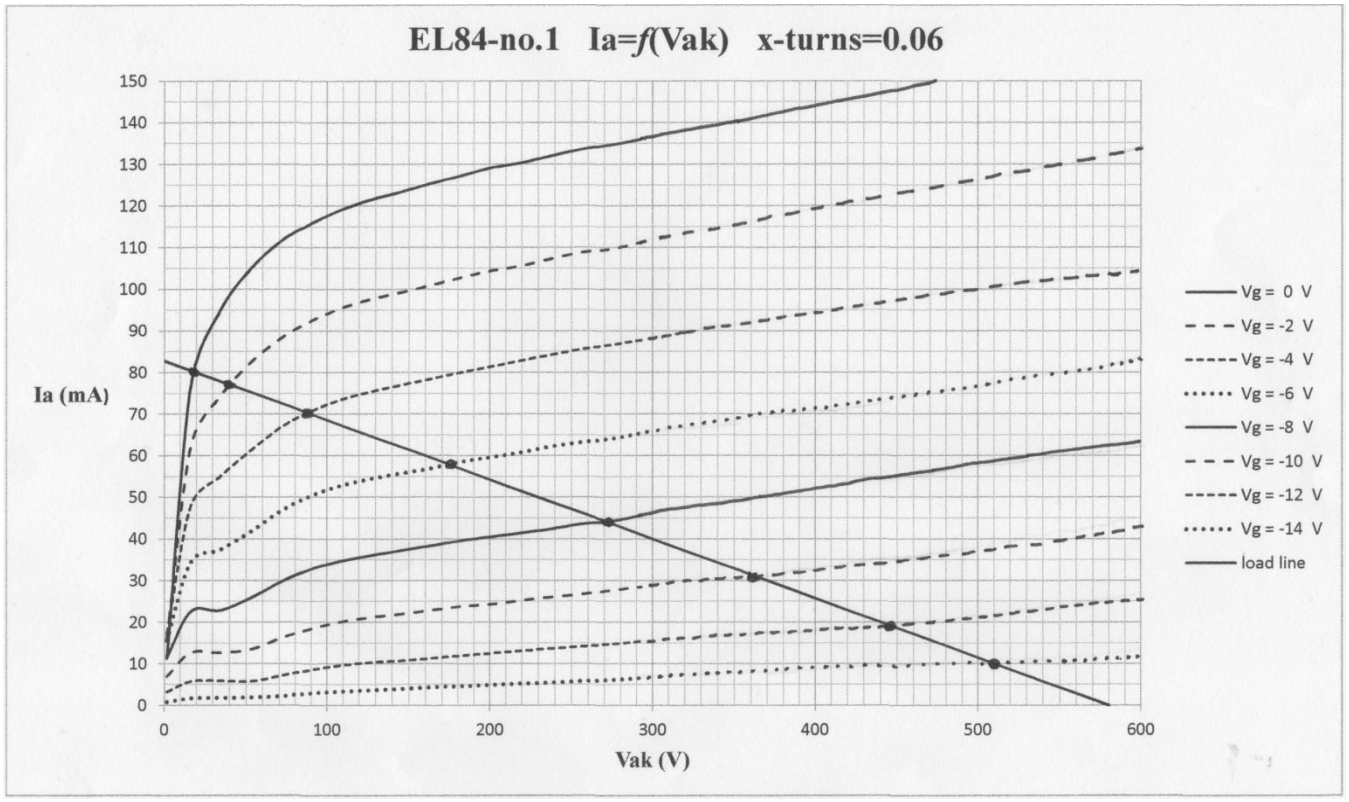
The constructed dynamic transconductances of appendix D are derived from the anode characteristics of appendix C (see the points of intersection of the V_{g1k}-curves with the load lines).

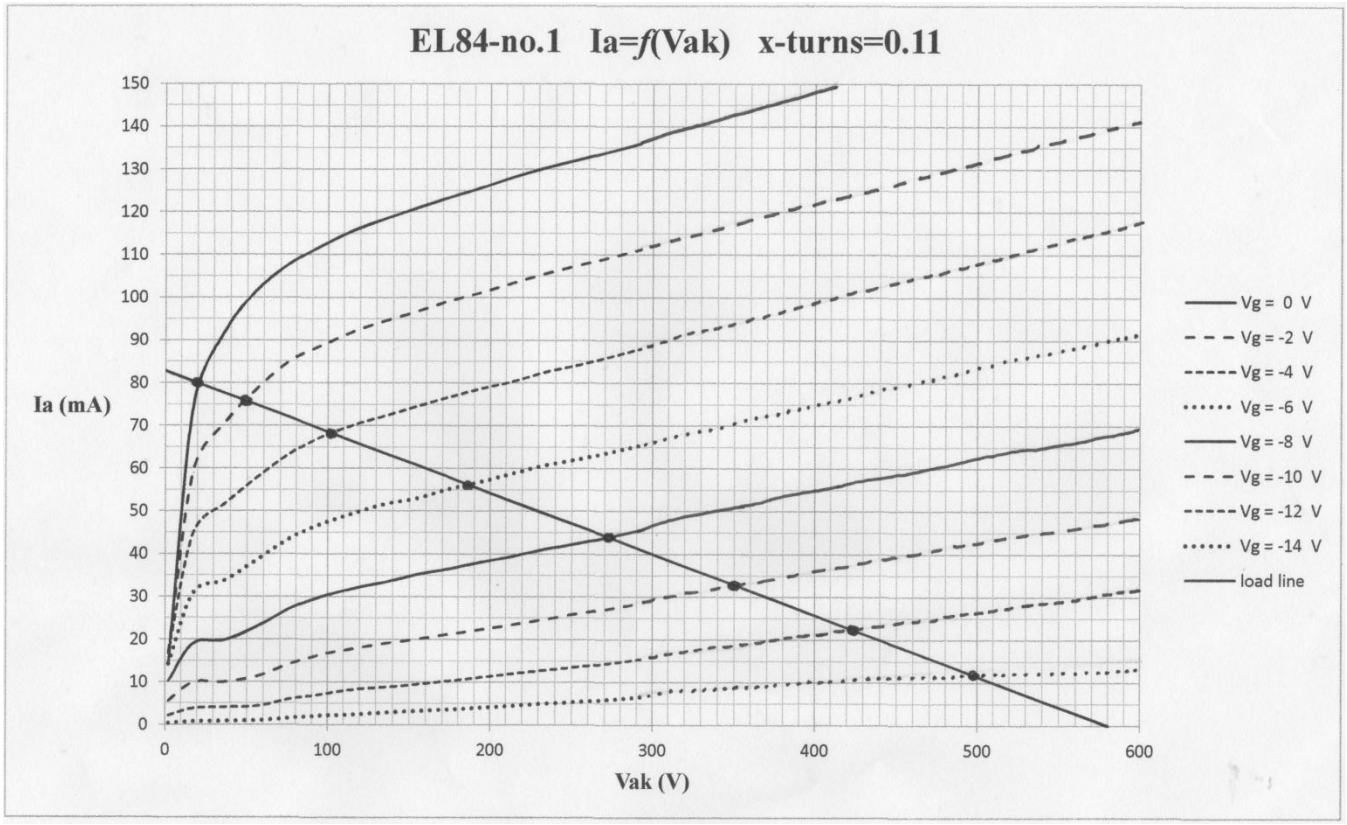
The constructed dynamic transconductances of appendix F are derived from the anode characteristics of appendix E (see the points of intersection of the V_{g1k}-curves with the load lines).

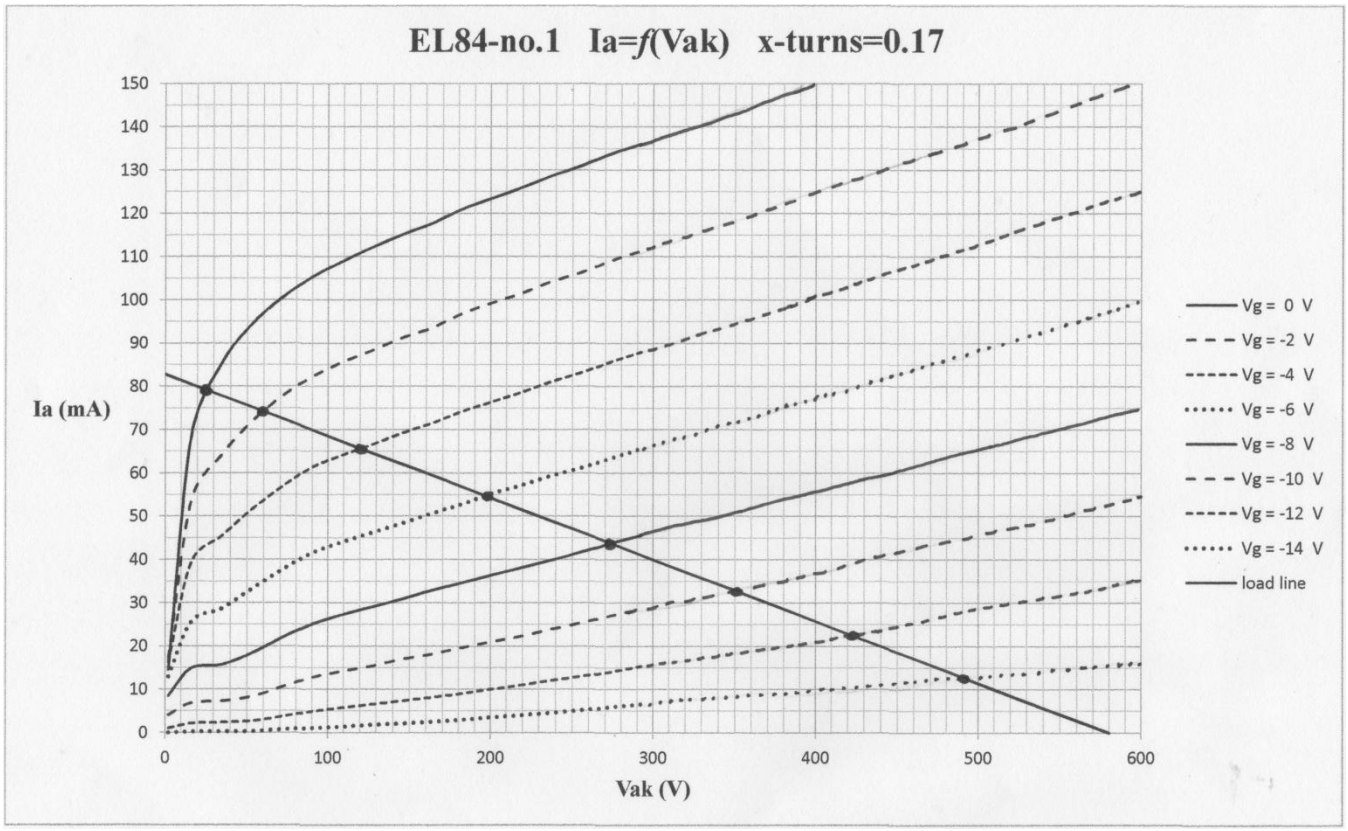
APPENDIX A

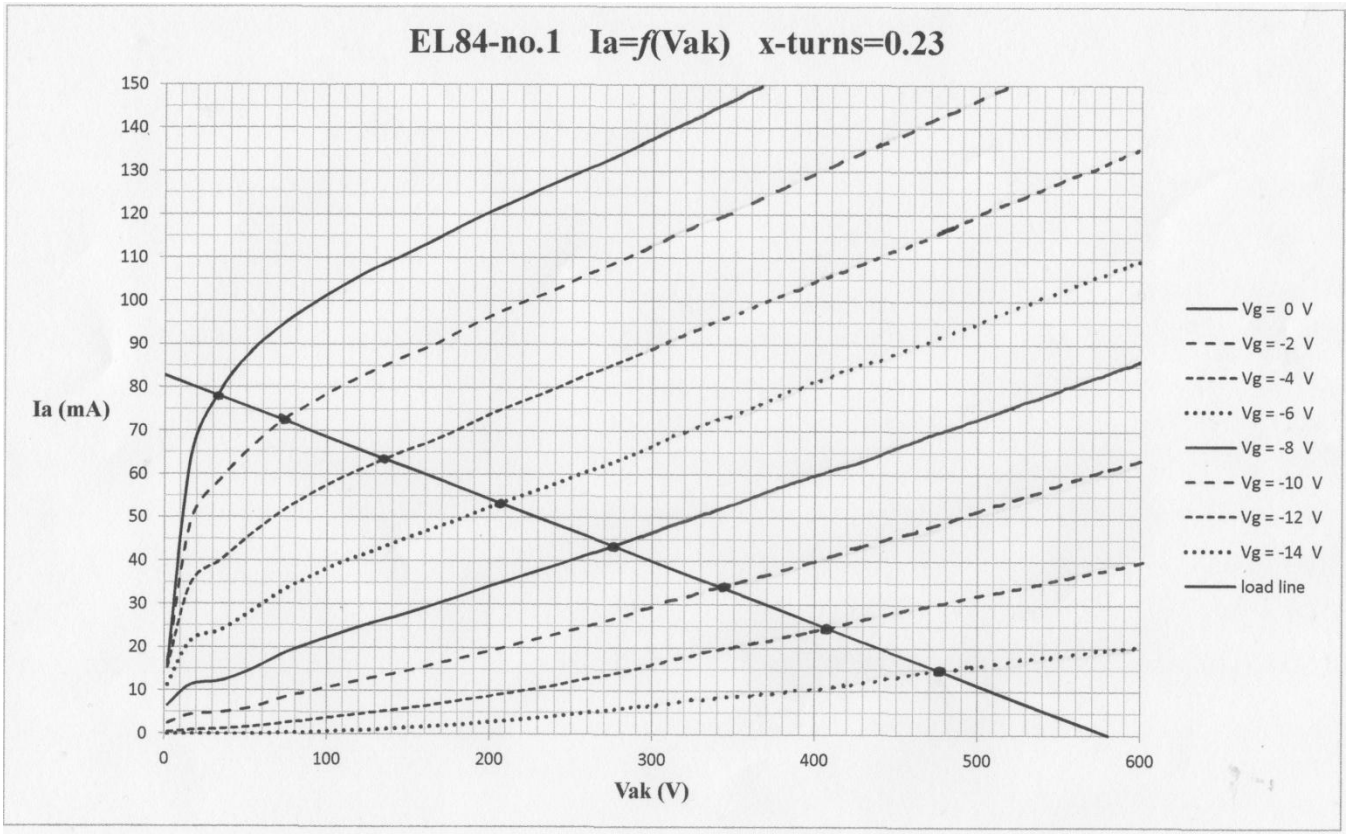
Measured with the µTracer and extrapolated anode characteristics of EL84 for several screen grid taps. Load line for EL84 goes through working point $V_{ak,w}$ = 300V, $I_{a,w}$ = 40mA and $V_{g1k,w} \approx -9.1$V.

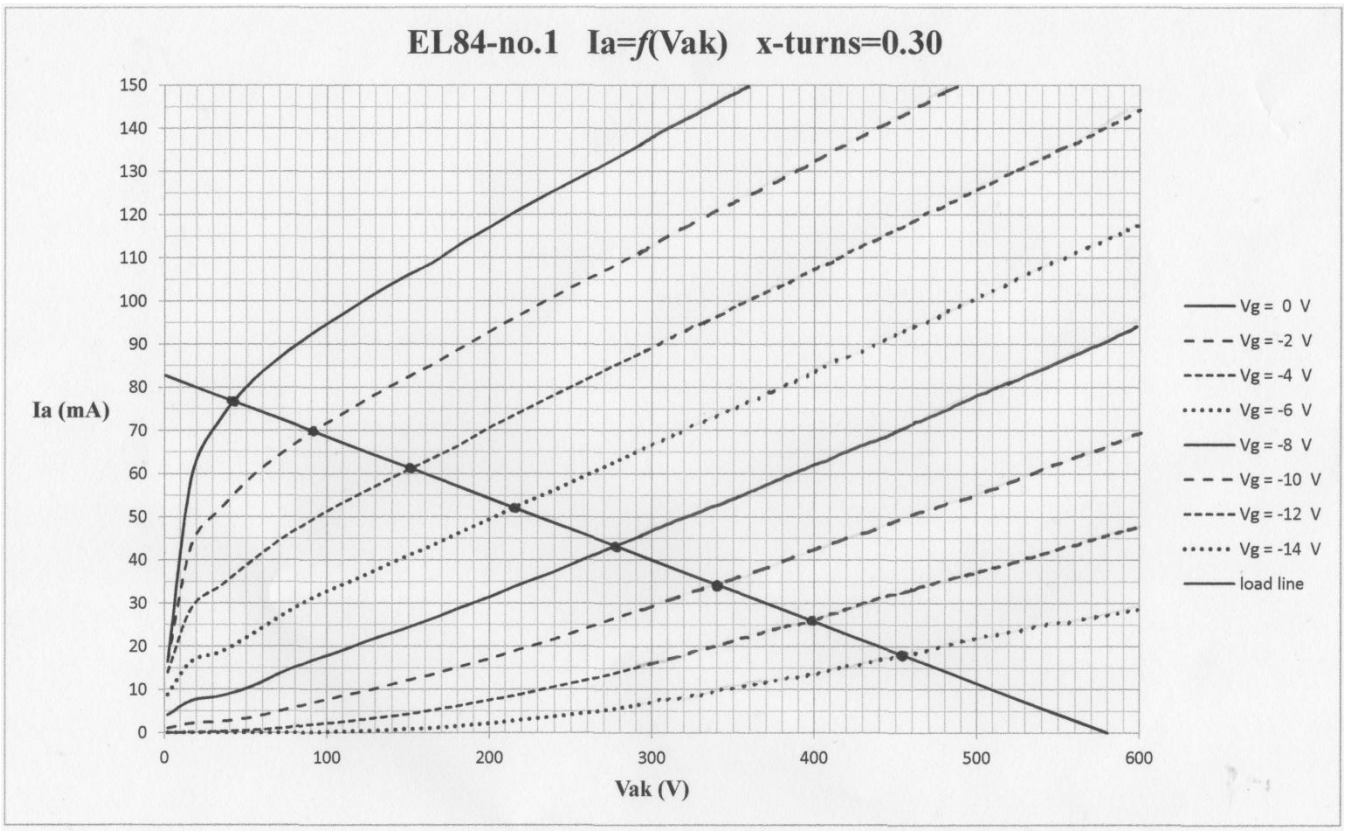


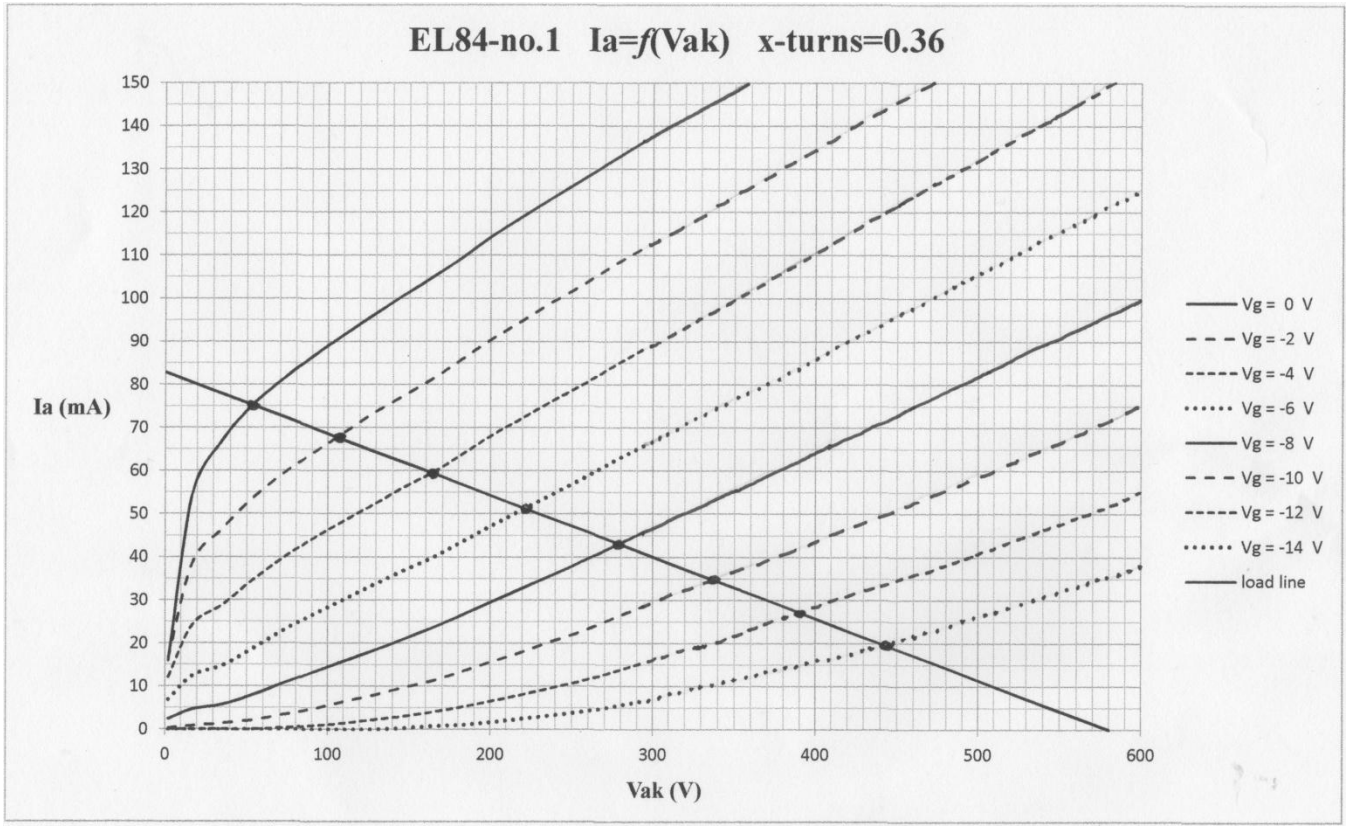


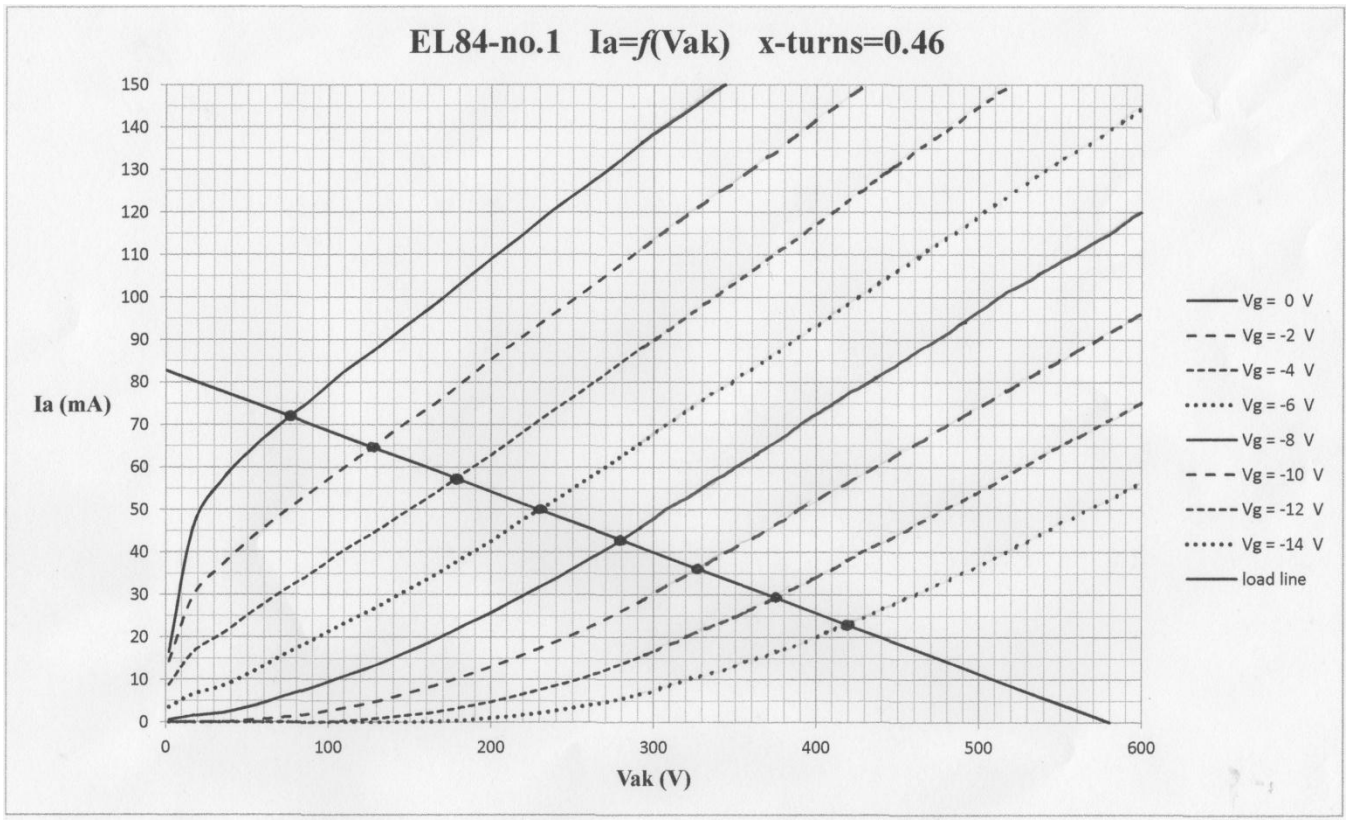

EL84-no.1 Ia=f(Vak) x-turns=0.11
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
0
100
200
300
400
500
600
Vg = 0 V
Vg = -2 V
Vg = -4 V
Vg = -6 V
Vg = -8 V
Vg = -10 V
Vg = -12 V
Vg = -14 V
load line

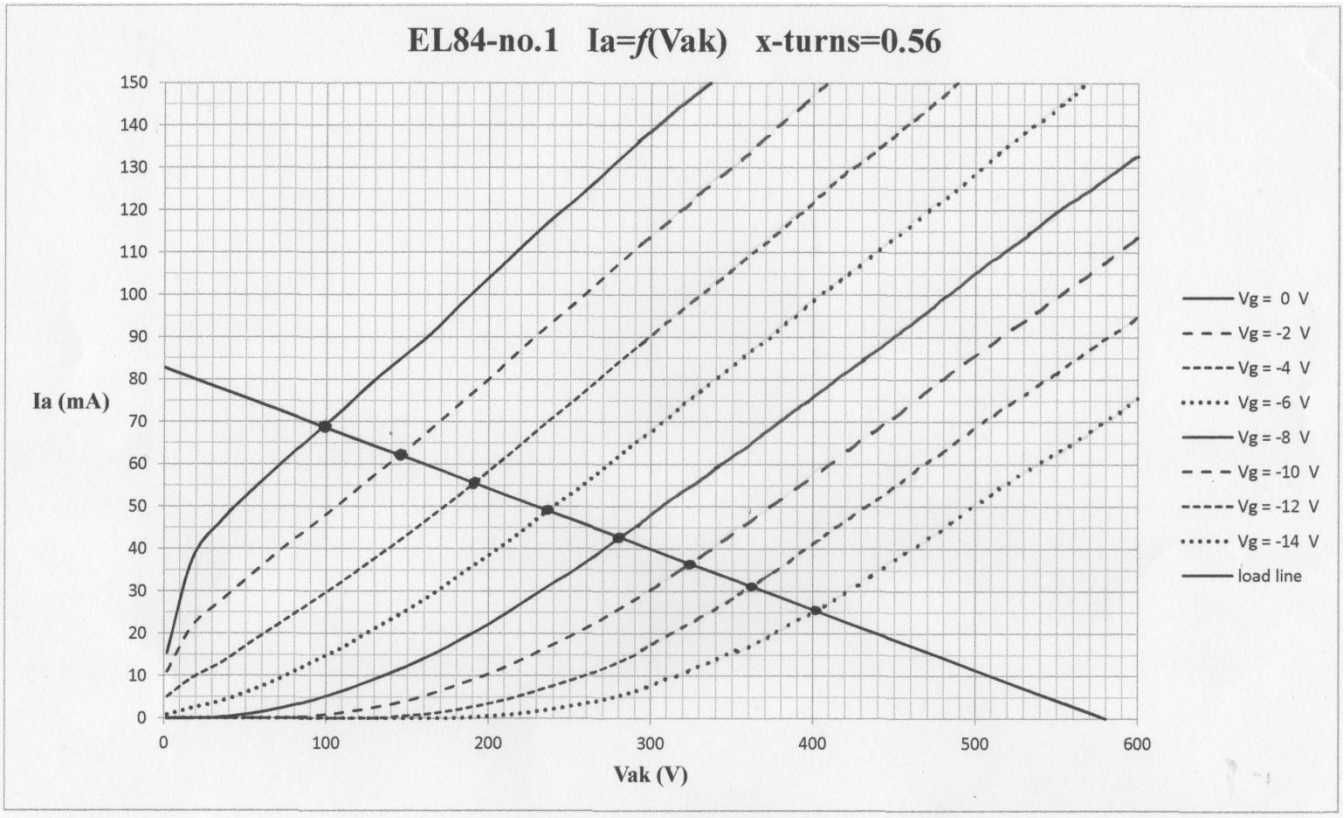

EL84-no.1 Ia=f(Vak) x-turns=0.17
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
0
100
200
300
400
500
600
Vg = 0 V
Vg = -2 V
Vg = -4 V
Vg = -6 V
Vg = -8 V
Vg = -10 V
Vg = -12 V
Vg = -14 V
load line

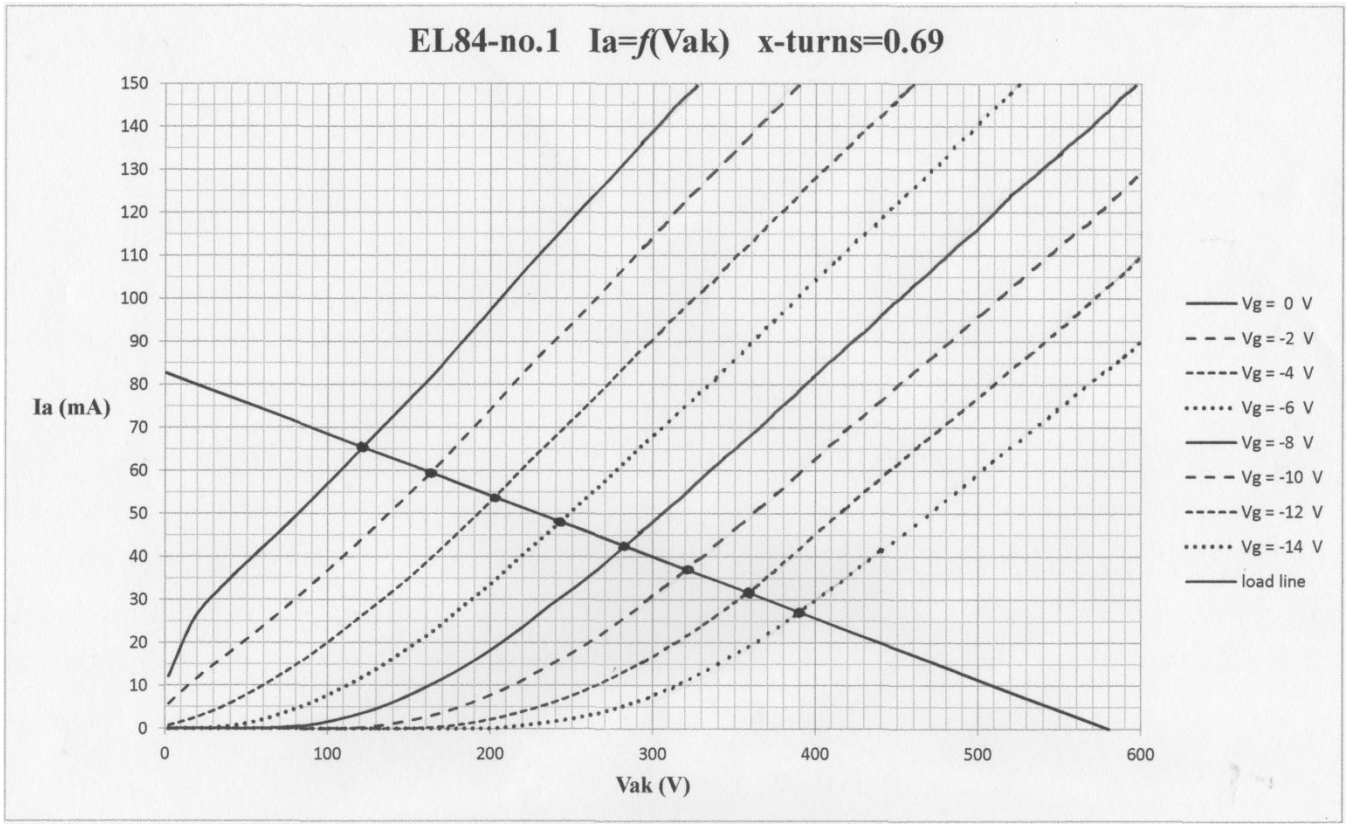

EL84-no.1 Ia=f(Vak) x-turns=0.23
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
0
100
200
300
400
500
600
Vg = 0 V
Vg = -2 V
Vg = -4 V
Vg = -6 V
Vg = -8 V
Vg = -10 V
Vg = -12 V
Vg = -14 V
load line

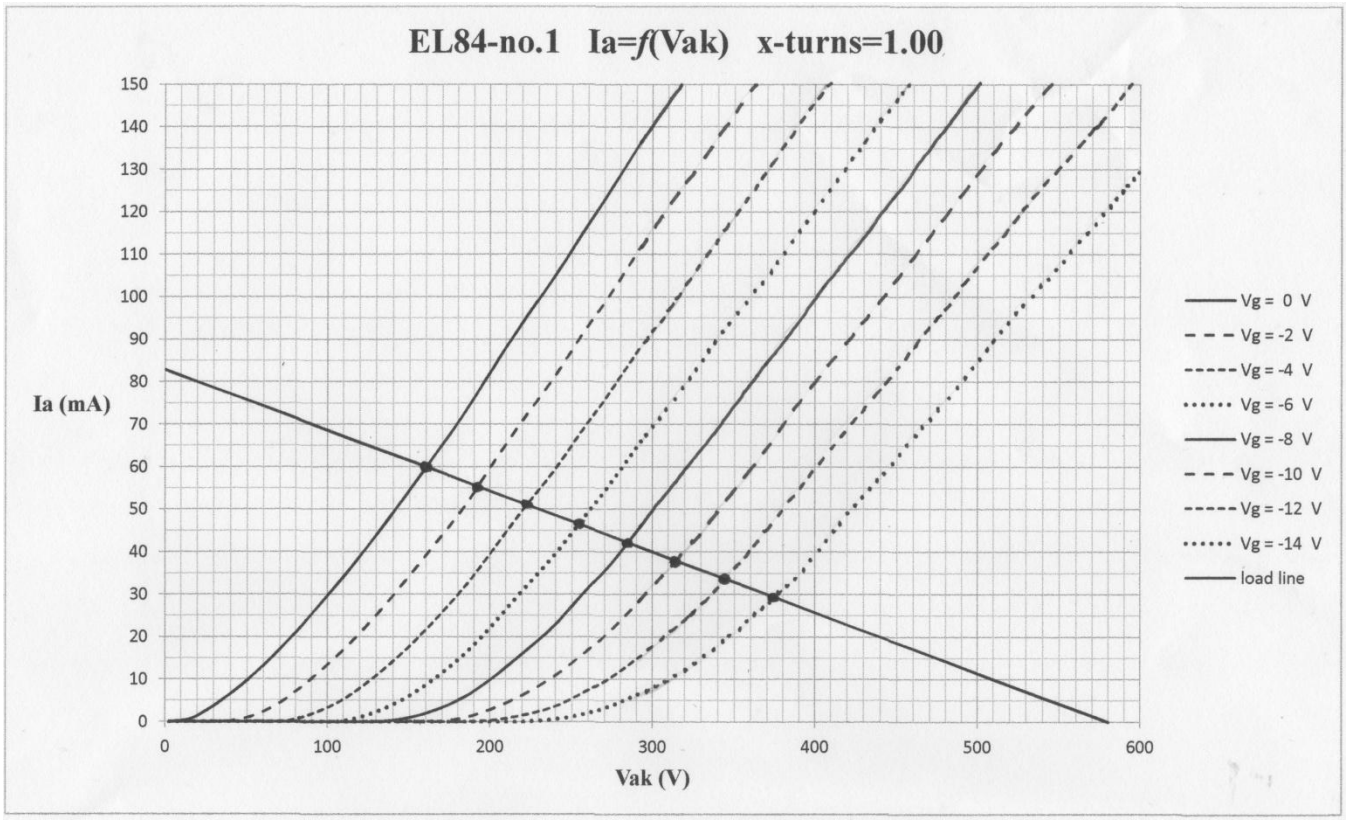

EL84-no.1 Ia=f(Vak) x-turns=0.30
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
0
100
200
300
400
500
600
Vg = 0 V
Vg = -2 V
Vg = -4 V
Vg = -6 V
Vg = -8 V
Vg = -10 V
Vg = -12 V
Vg = -14 V
load line


EL84-no.1 Ia=f(Vak) x-turns=0.36
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
0
100
200
300
400
500
600
Vg = 0 V
Vg = -2 V
Vg = -4 V
Vg = -6 V
Vg = -8 V
Vg = -10 V
Vg = -12 V
Vg = -14 V
load line


EL84-no.1 Ia=f(Vak) x-turns=0.46
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
0
100
200
300
400
500
600
Vg = 0 V
Vg = -2 V
Vg = -4 V
Vg = -6 V
Vg = -8 V
Vg = -10 V
Vg = -12 V
Vg = -14 V
load line

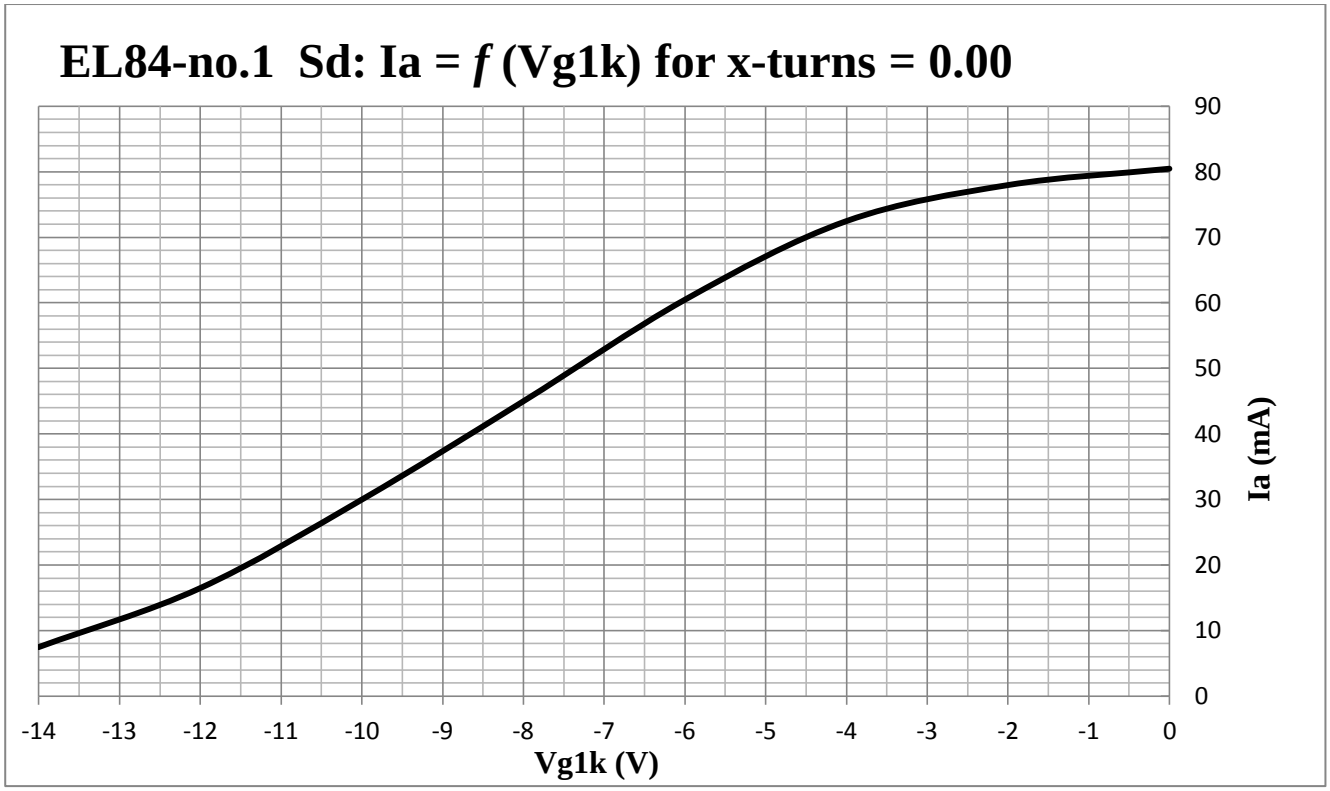

EL84-no.1 Ia=f(Vak) x-turns=0.56
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
0
100
200
300
400
500
600
Vg = 0 V
Vg = -2 V
Vg = -4 V
Vg = -6 V
Vg = -8 V
Vg = -10 V
Vg = -12 V
Vg = -14 V
load line

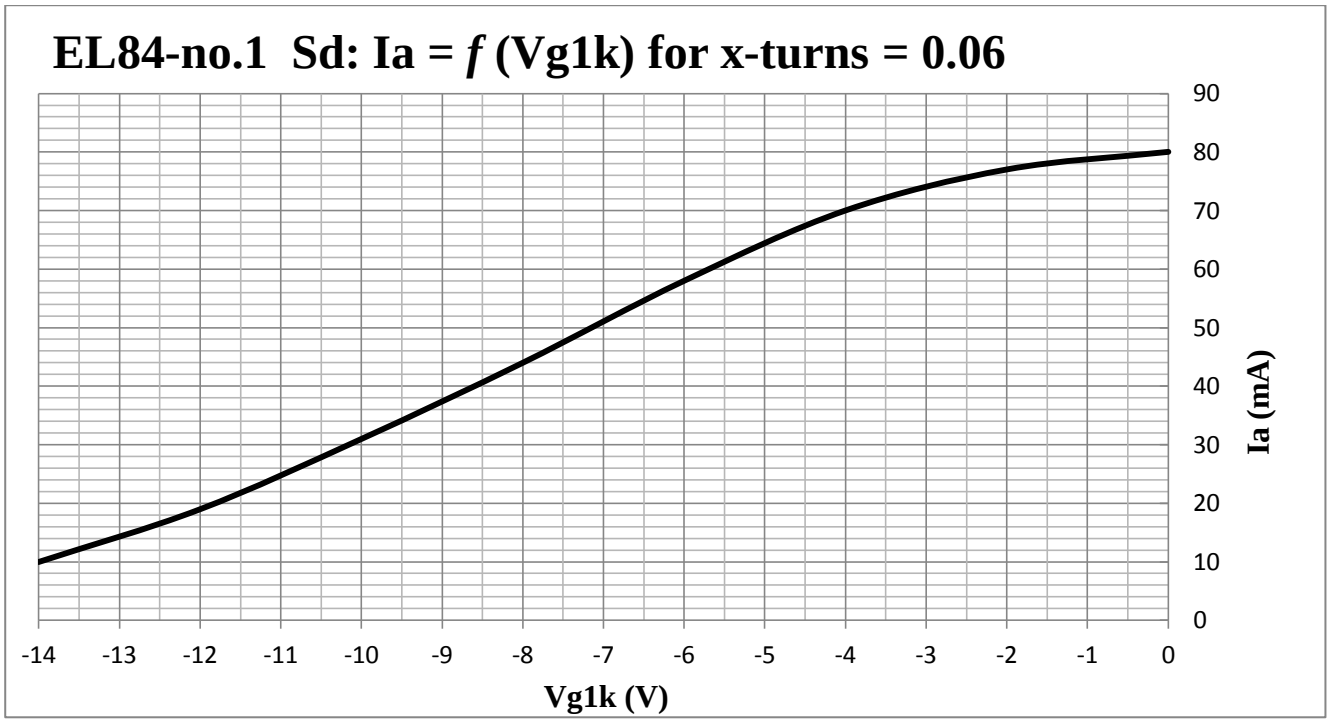

EL84-no.1 Ia=f(Vak) x-turns=0.69
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
0
100
200
300
400
500
600
Vg = 0 V
Vg = -2 V
Vg = -4 V
Vg = -6 V
Vg = -8 V
Vg = -10 V
Vg = -12 V
Vg = -14 V
load line

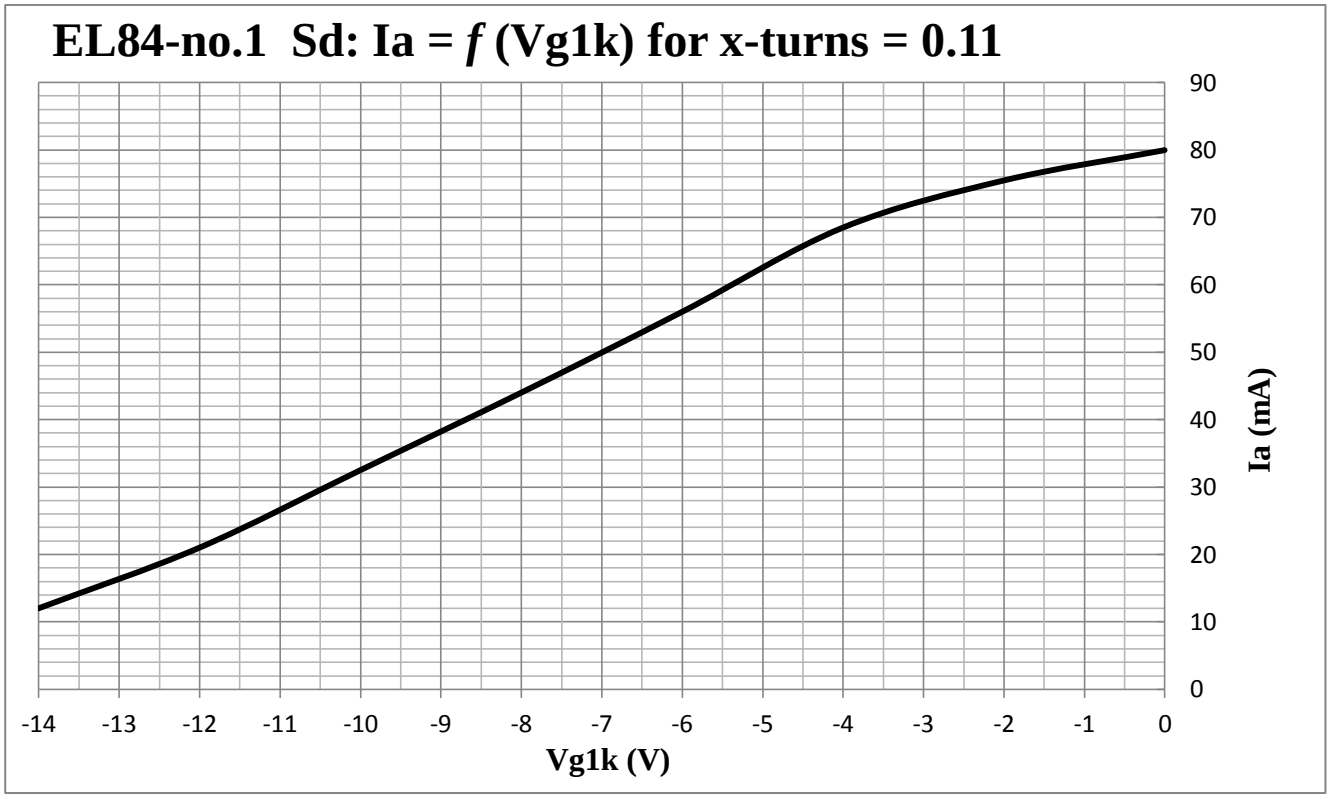

EL84-no.1 Ia=f(Vak) x-turns=1.00
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
0
100
200
300
400
500
600
Vg = 0 V
Vg = -2 V
Vg = -4 V
Vg = -6 V
Vg = -8 V
Vg = -10 V
Vg = -12 V
Vg = -14 V
load line

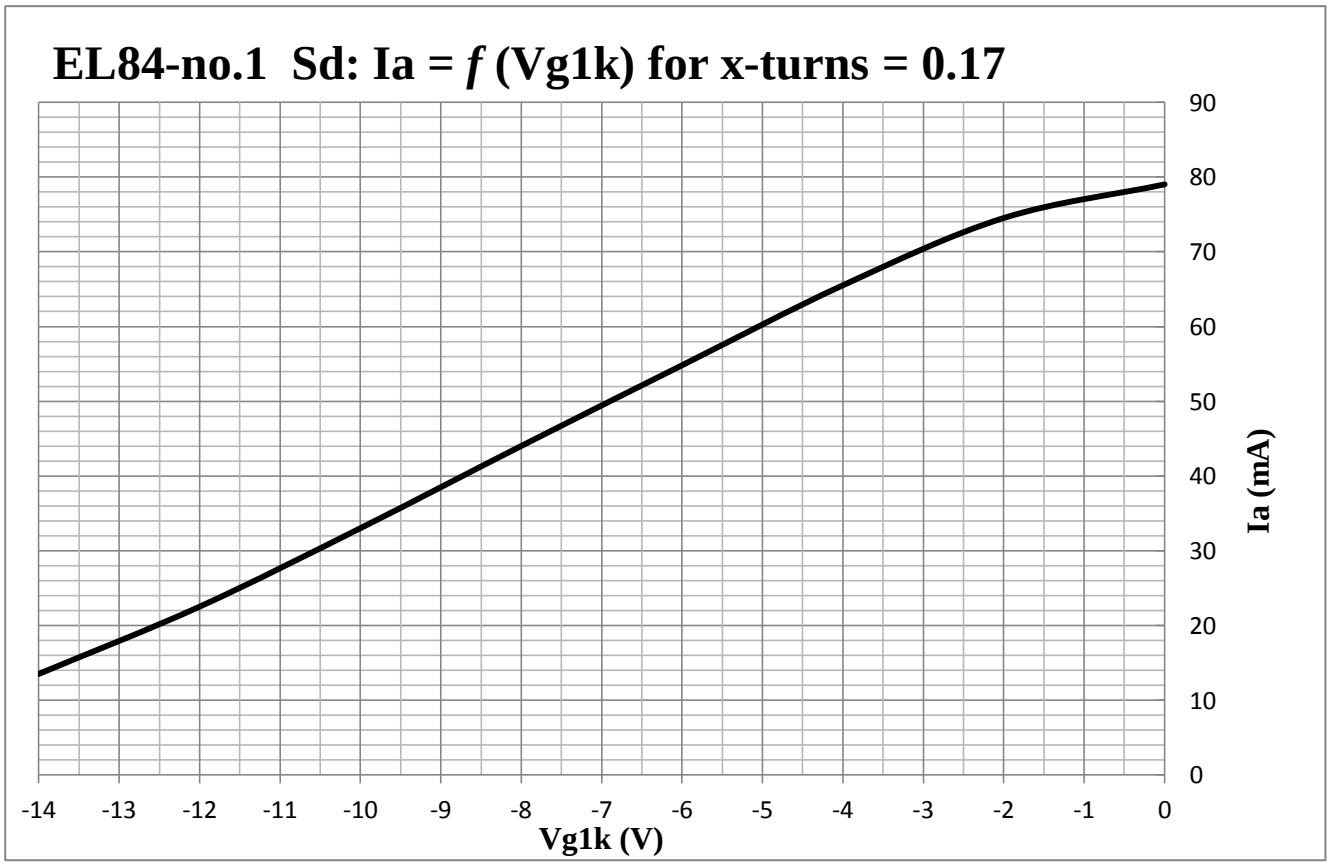
APPENDIX B

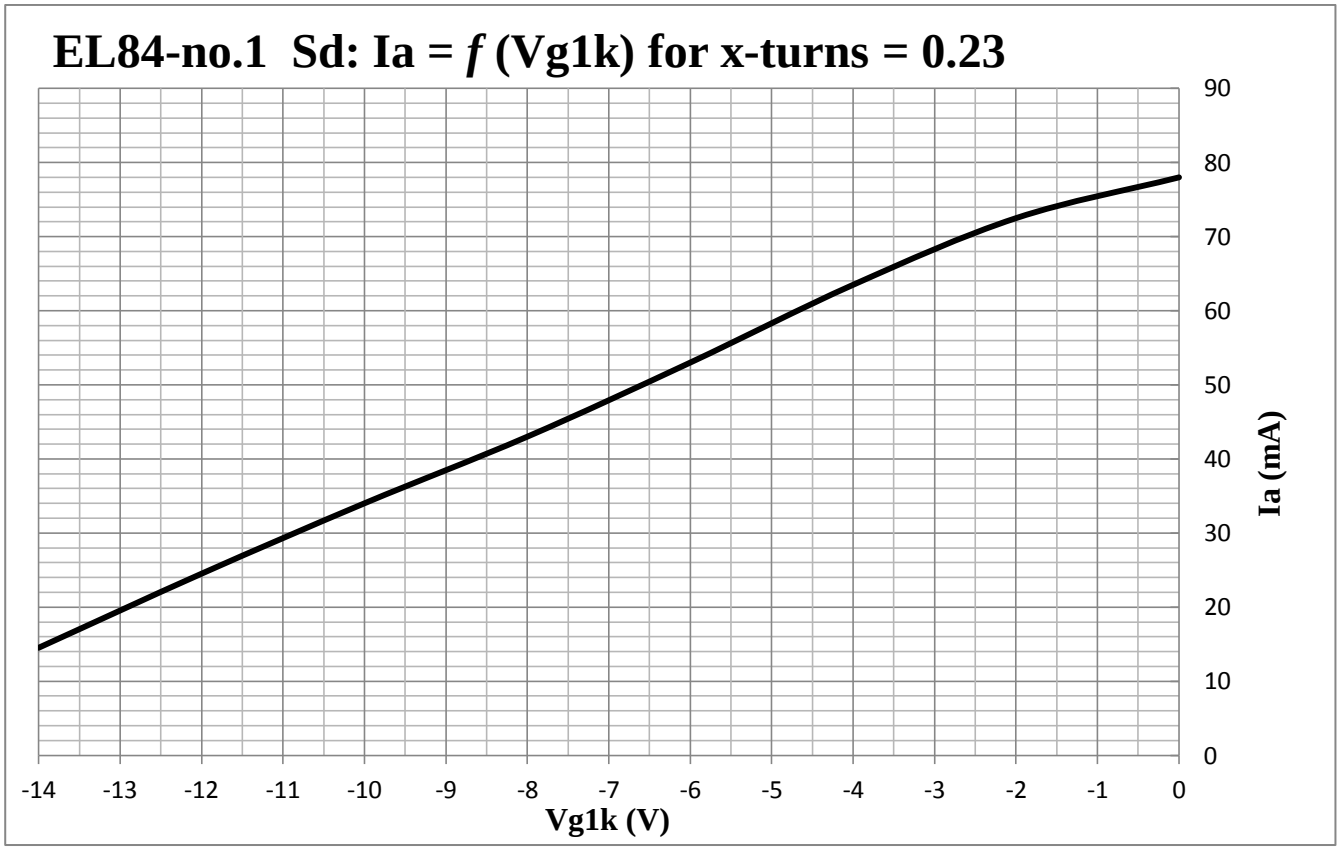
Constructed dynamic transconductance characteristics of EL84 for several screen grid taps.

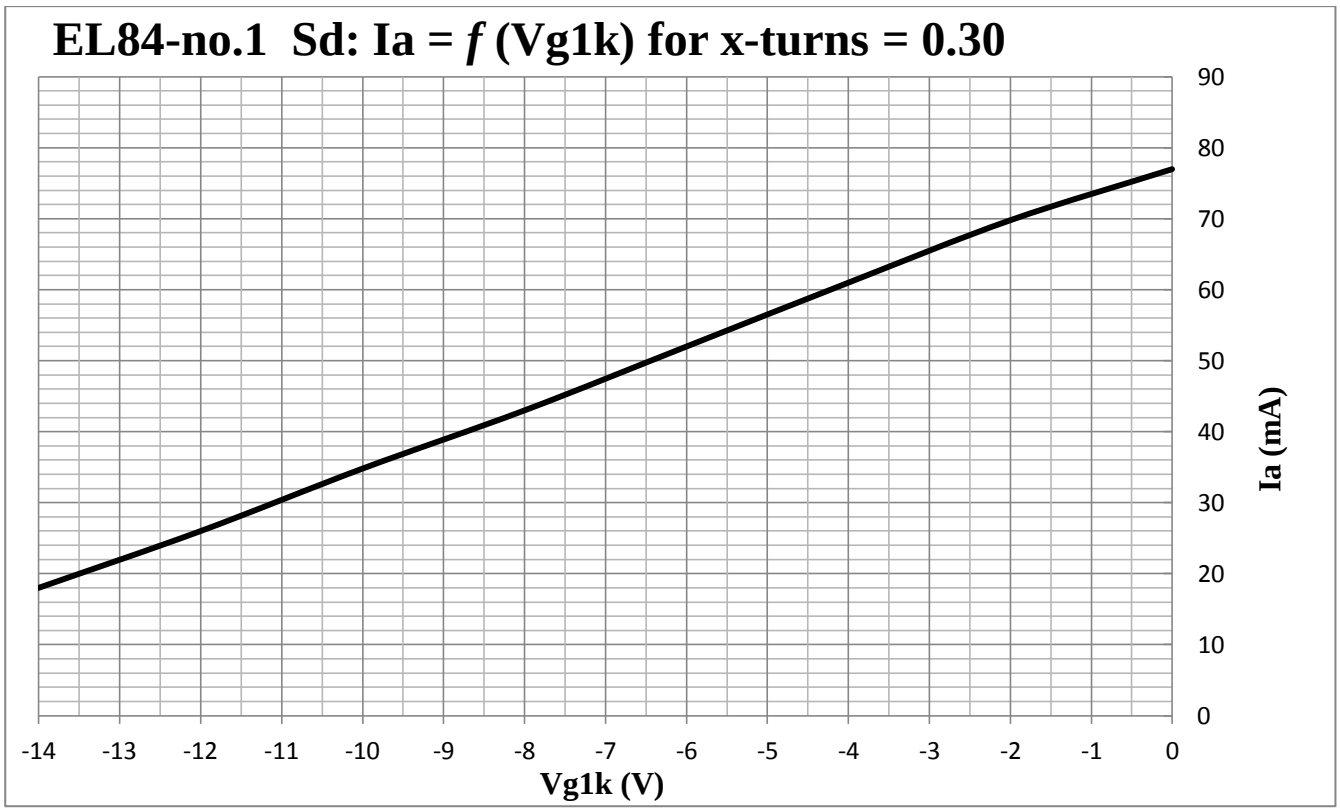


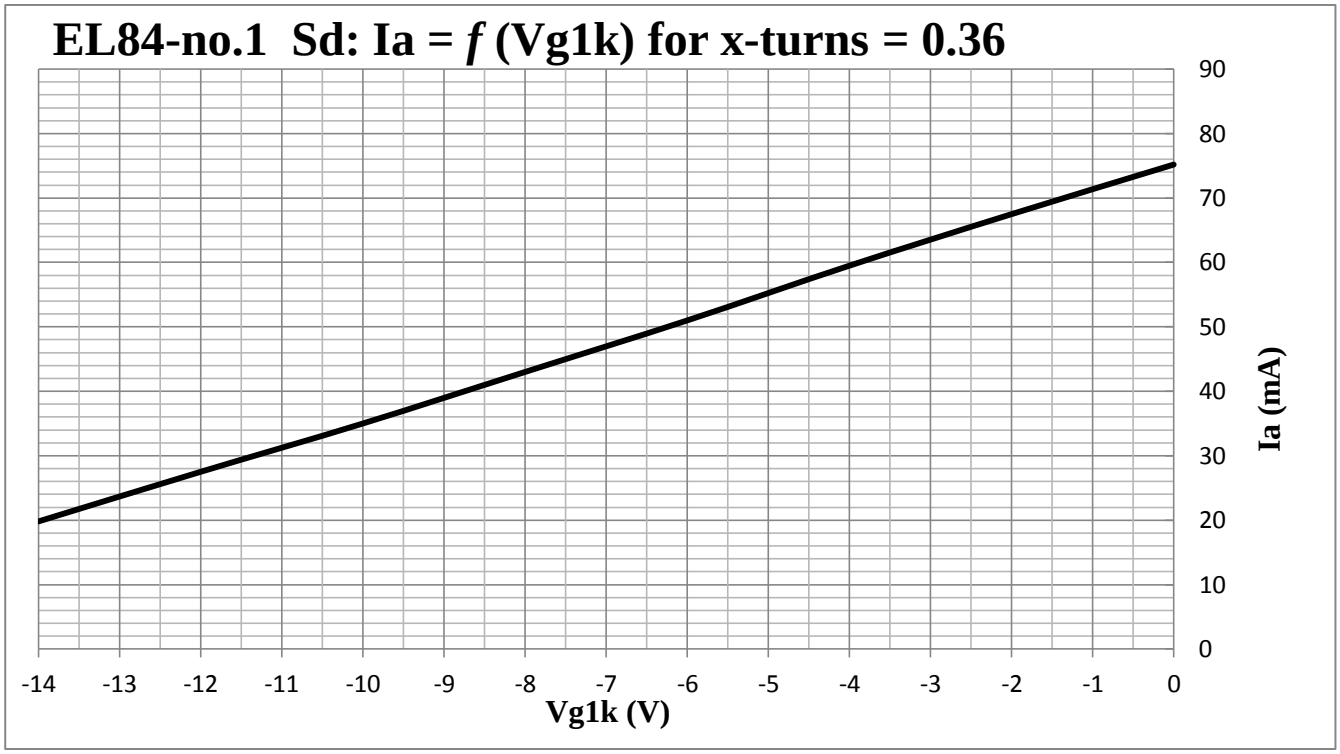


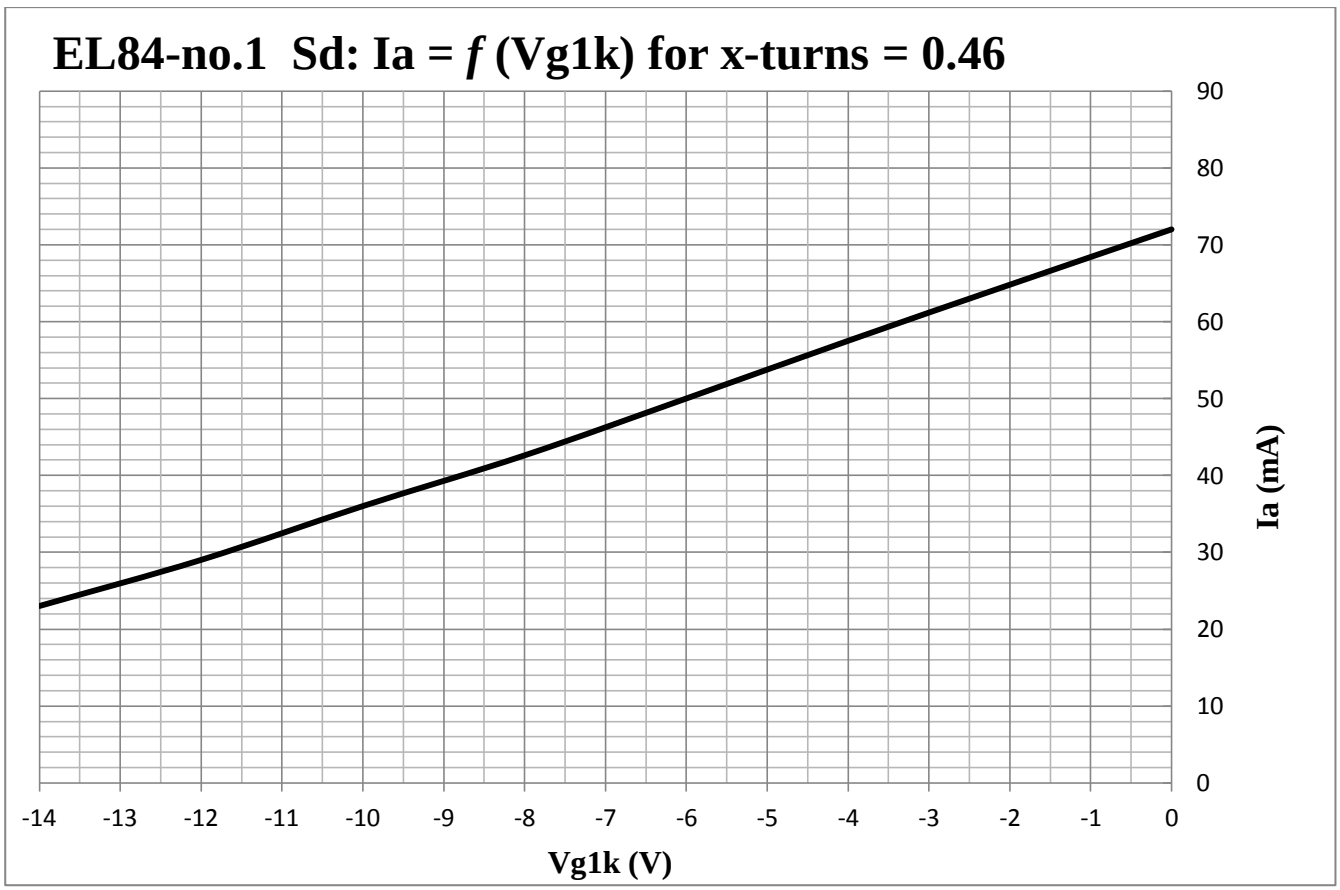

EL84-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.11
90
80
70
60
50
40
30
20
10
0
Ia (mA)
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
Vg1k (V)

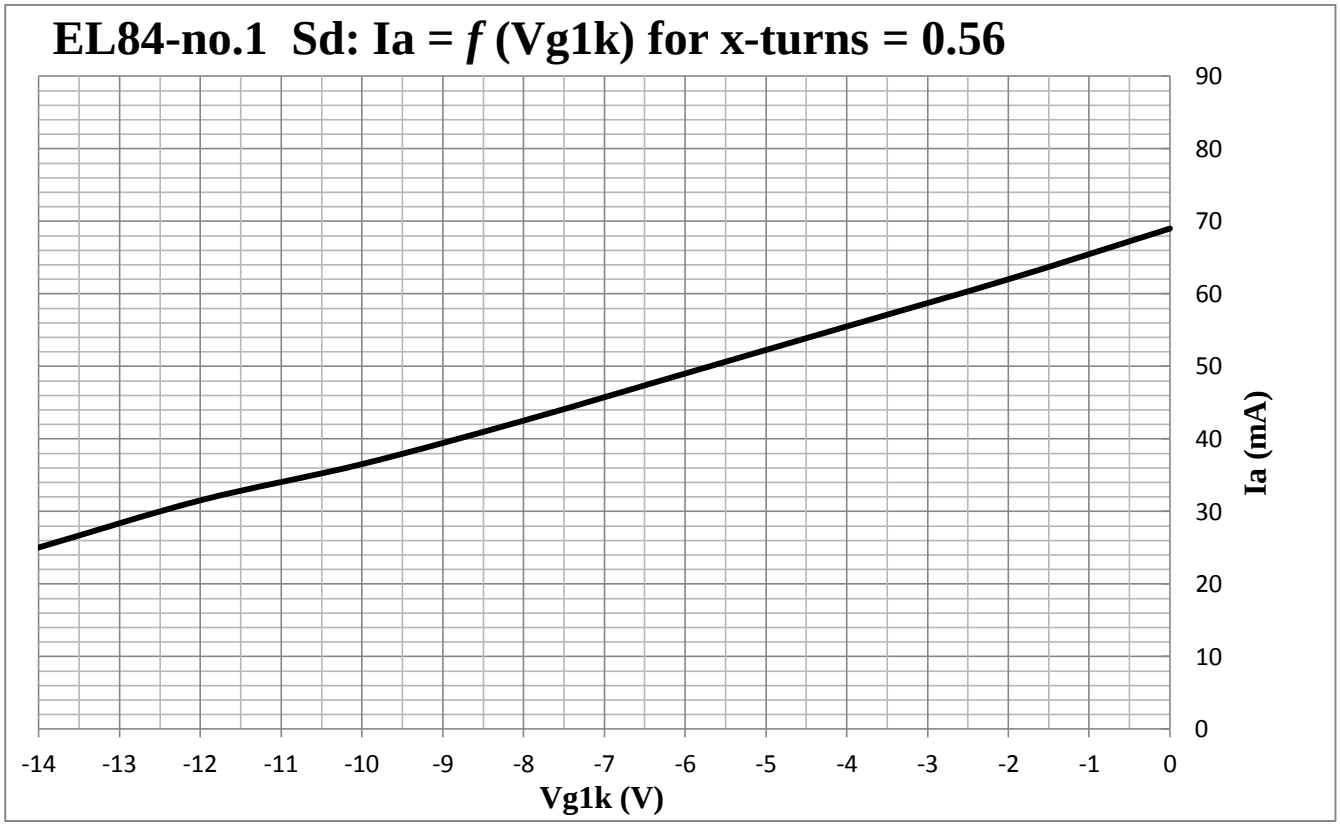

EL84-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.17
90
80
70
60
50
40
30
20
10
0
Ia (mA)
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
Vg1k (V)

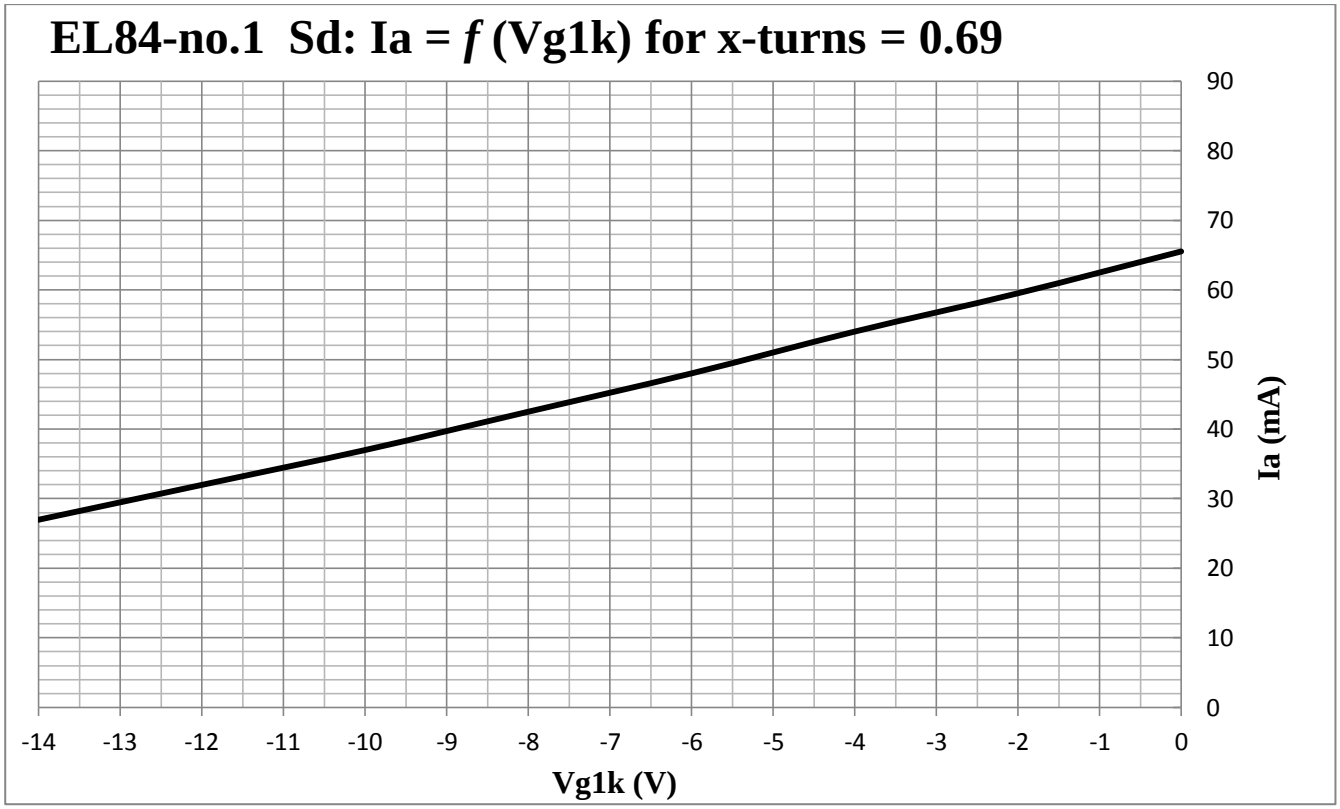

EL84-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.23
90
80
70
60
50
40
30
20
10
0
Ia (mA)
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
Vg1k (V)

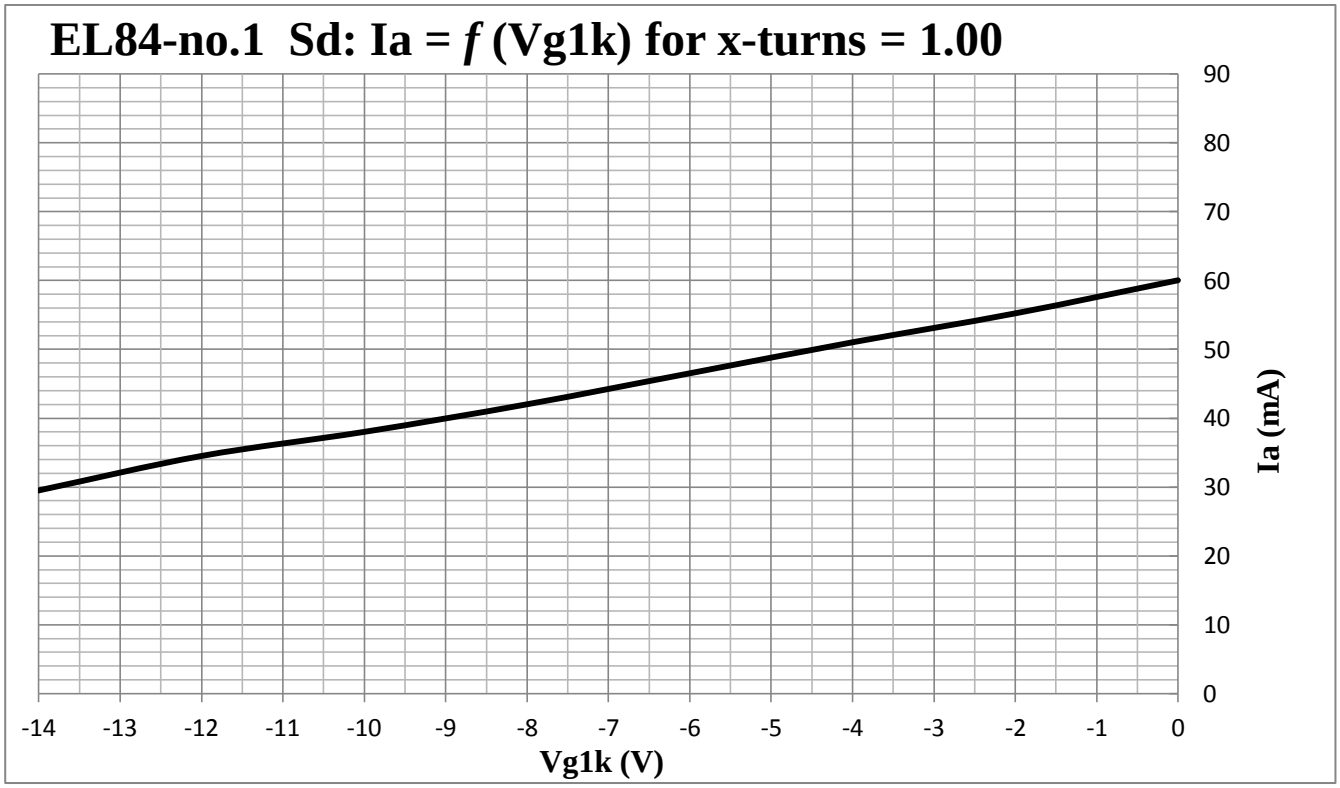

EL84-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.30
90
80
70
60
50
40
30
20
10
0
Ia (mA)
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
Vg1k (V)


EL84-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.36
90
80
70
60
50
40
30
20
10
0
Ia (mA)
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
Vg1k (V)

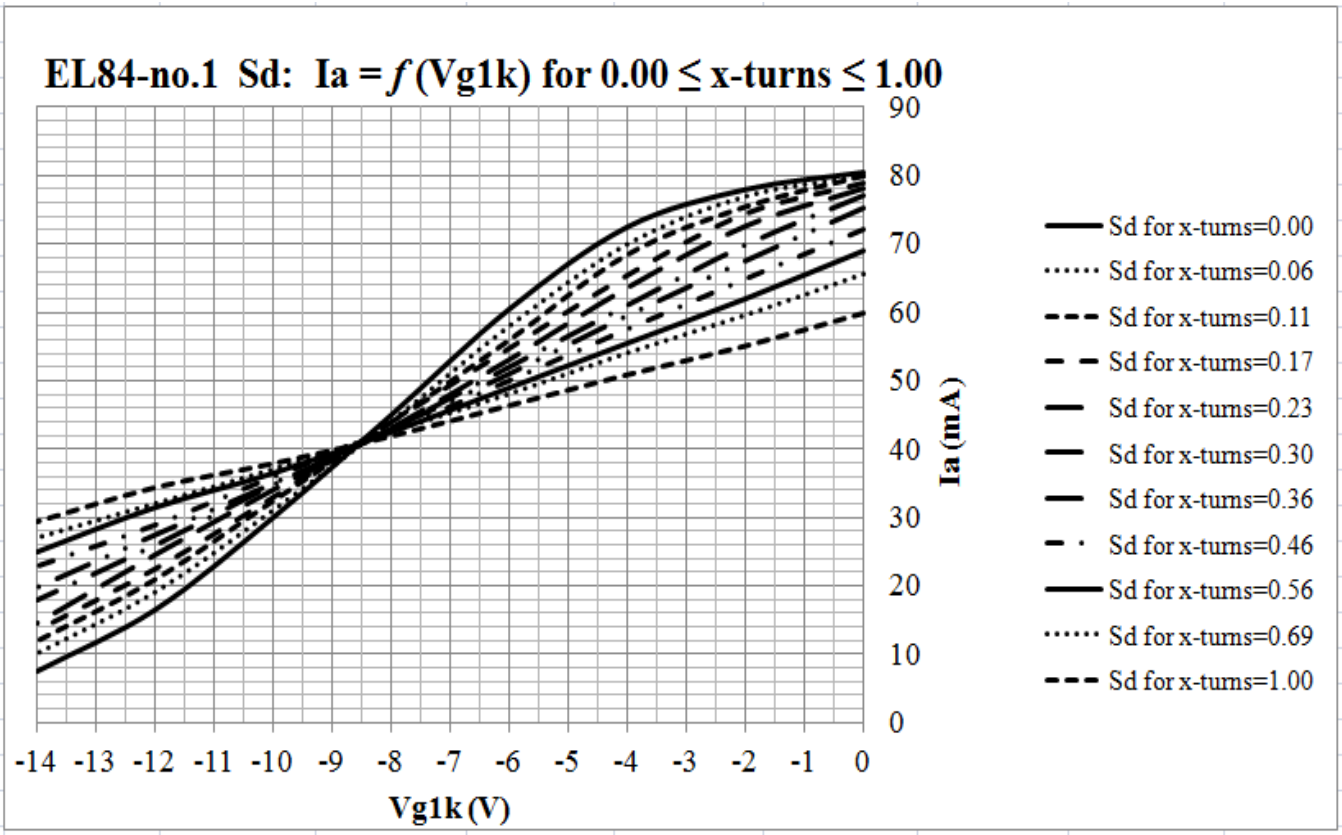

EL84-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.46
90
80
70
60
50
40
30
20
10
0
Ia (mA)
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
Vg1k (V)


EL84-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.56
90
80
70
60
50
40
30
20
10
0
Ia (mA)
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
Vg1k (V)


EL84-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.69
90
80
70
60
50
40
30
20
10
0
Ia (mA)
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
Vg1k (V)

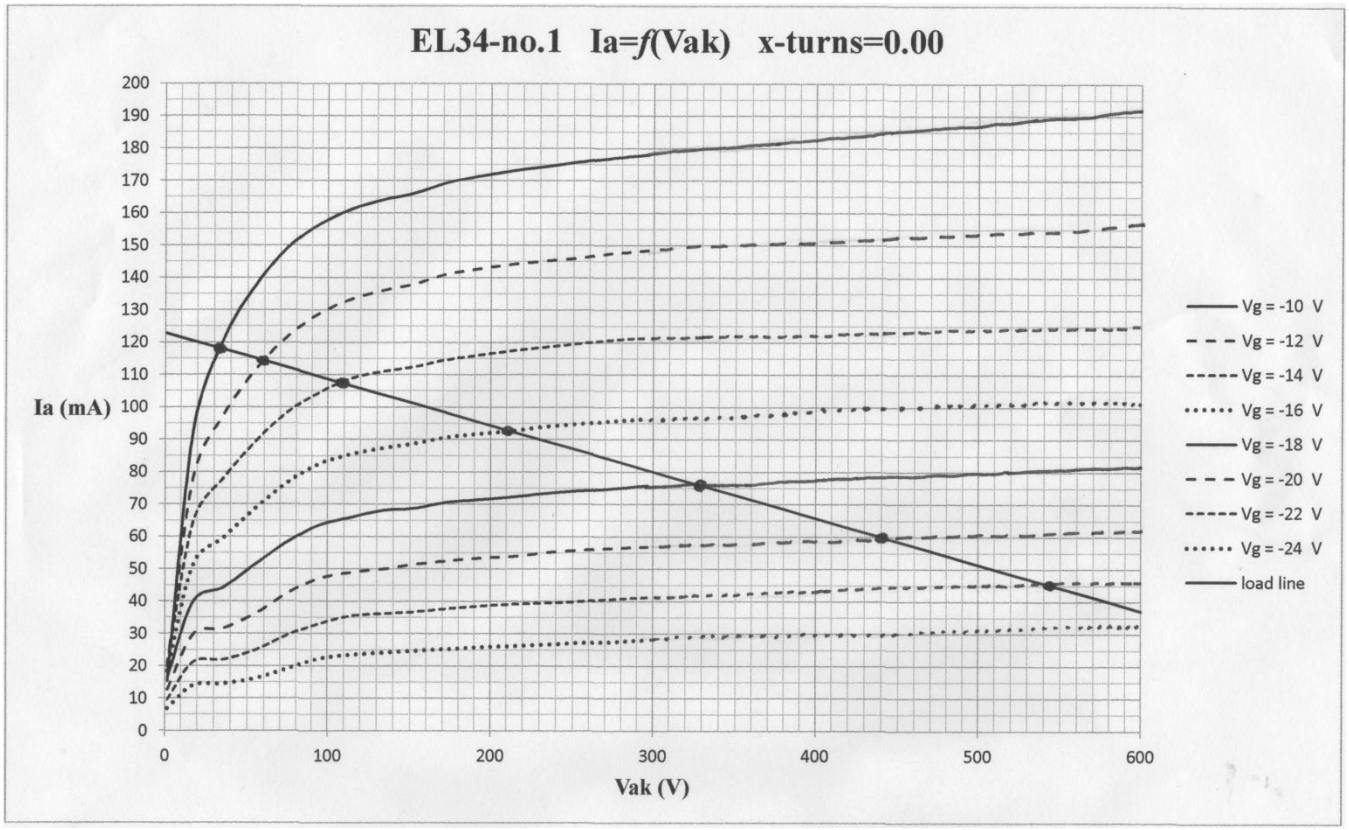


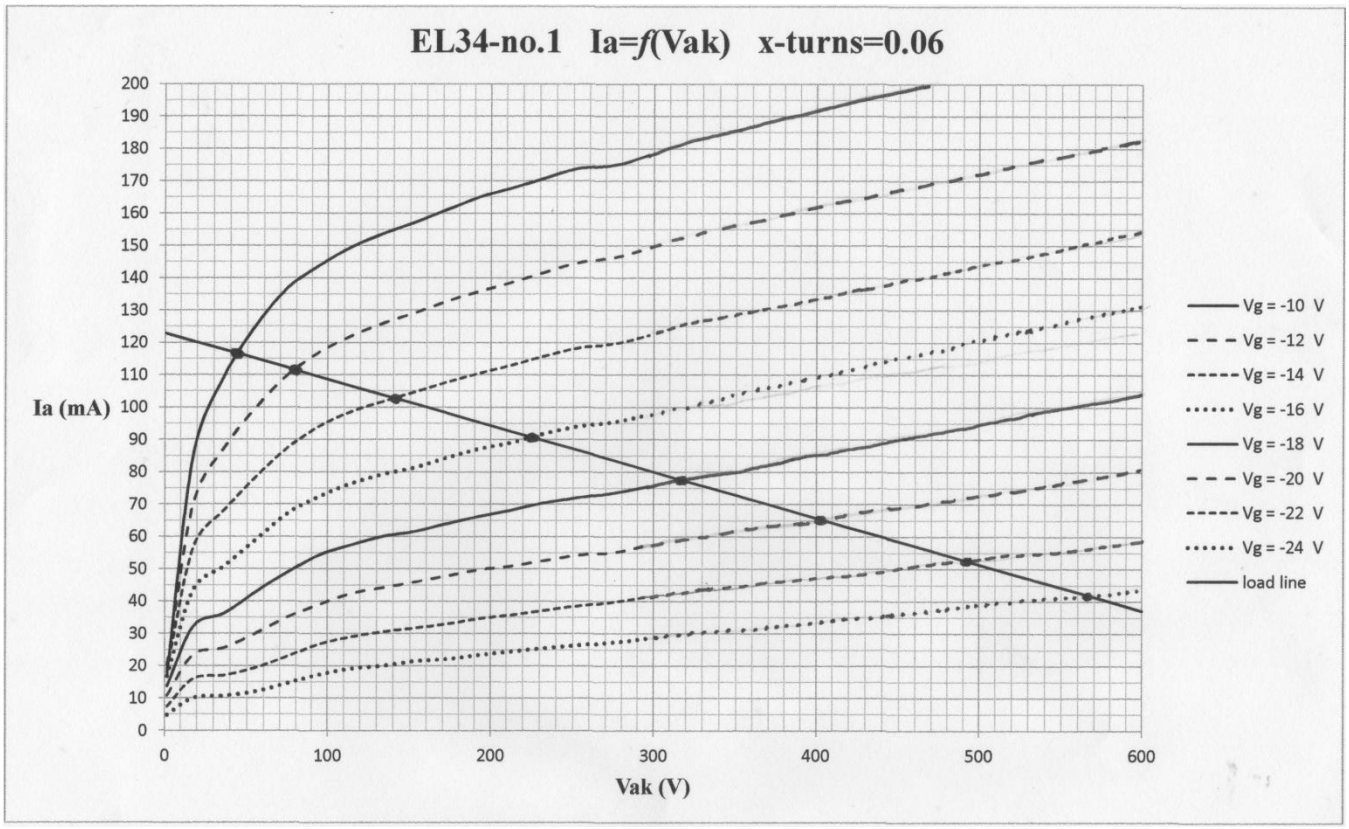
And finally all these S_d together in one transconductance characteristic.

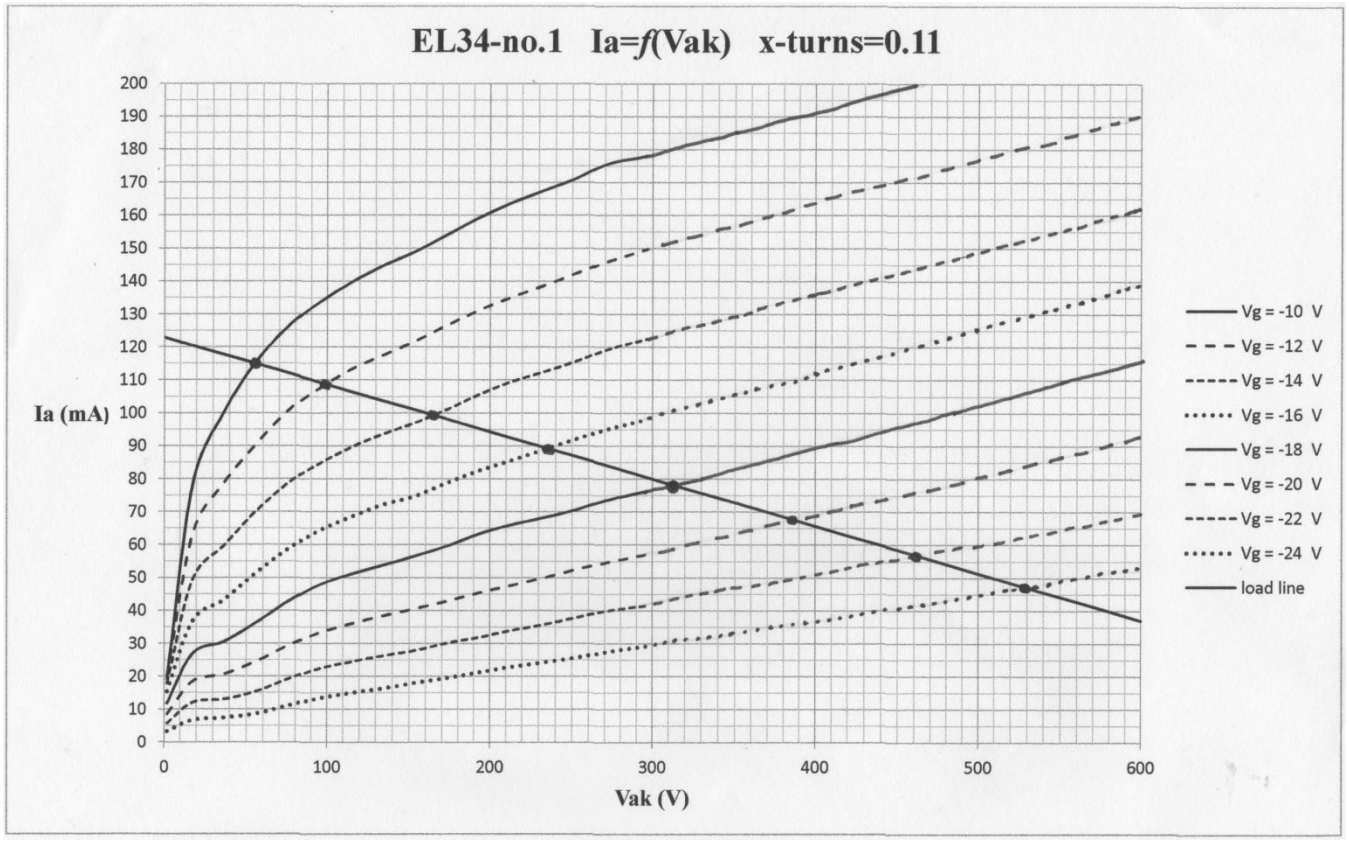


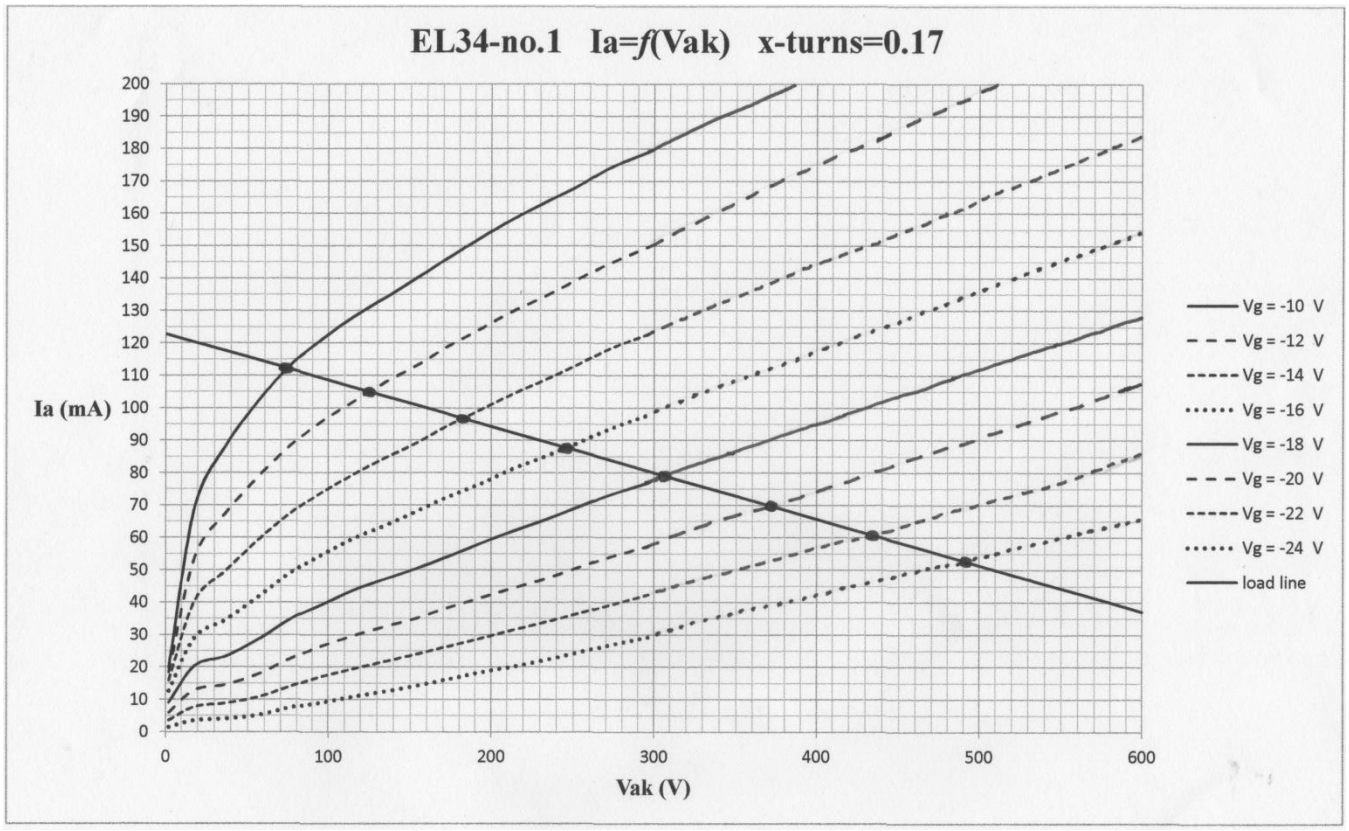
APPENDIX C

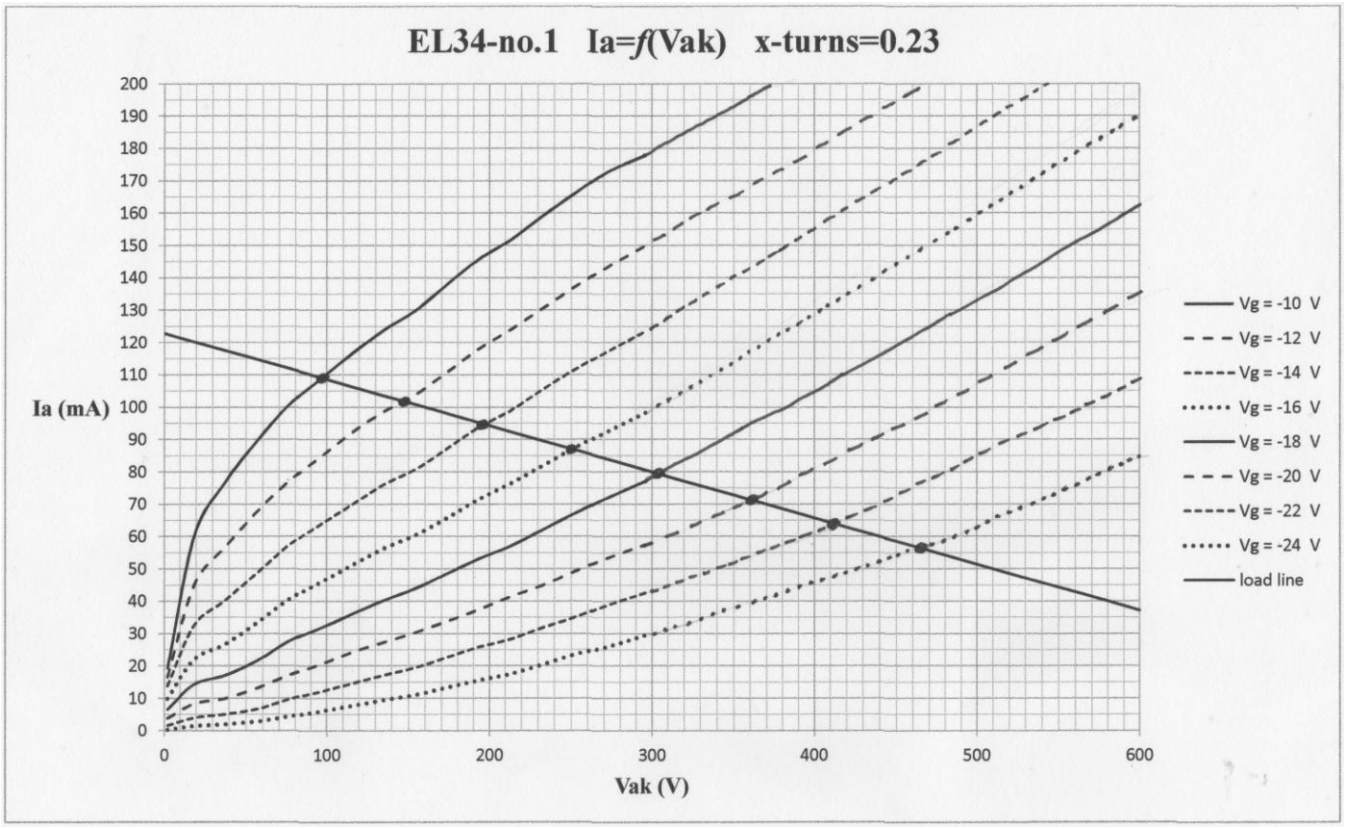
Measured with the µTracer and extrapolated anode characteristics of EL34 for several screen grid taps. Load line for EL34 goes through working point $V_{ak,w}$ = 300V, $I_{a,w}$ = 80mA and $V_{g1k,w} \approx -16.1$V.

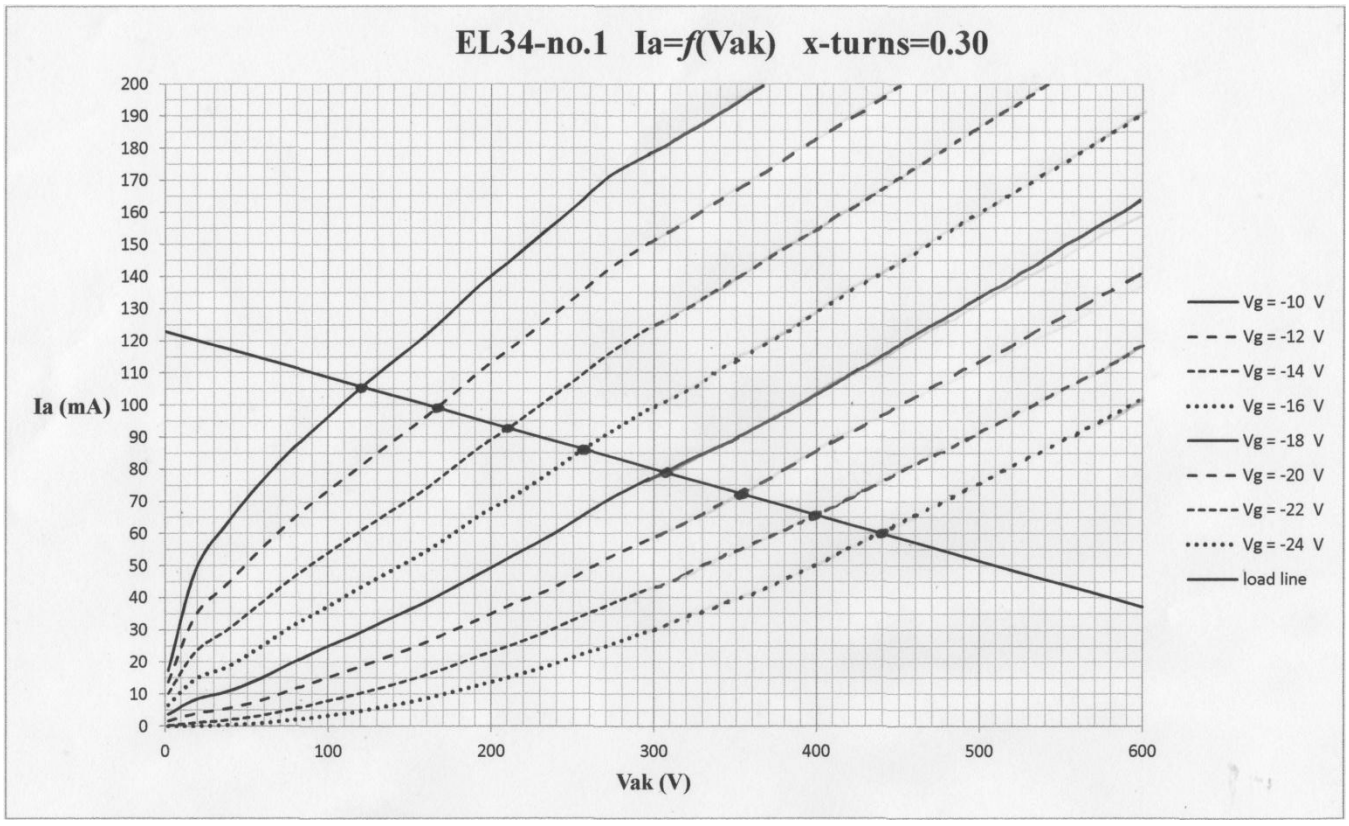


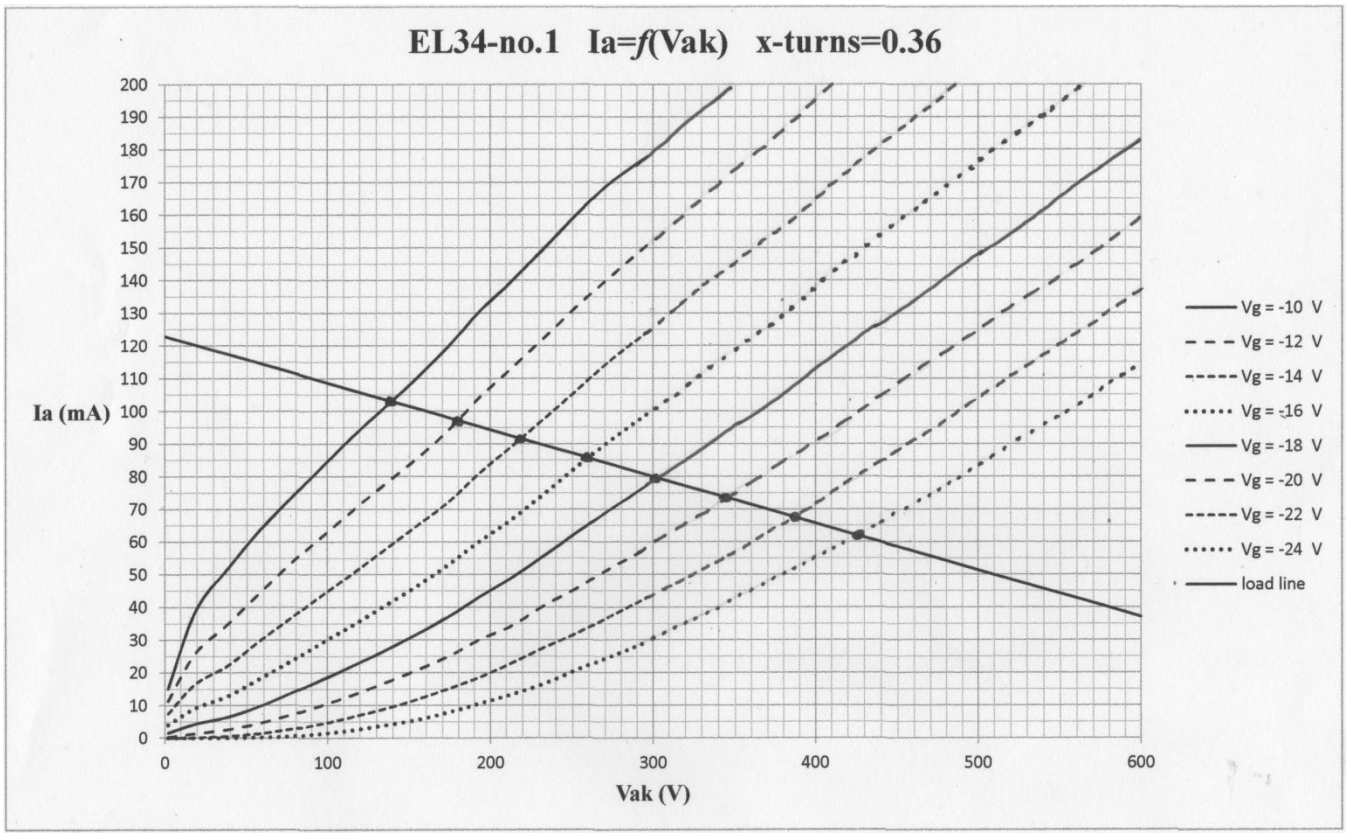


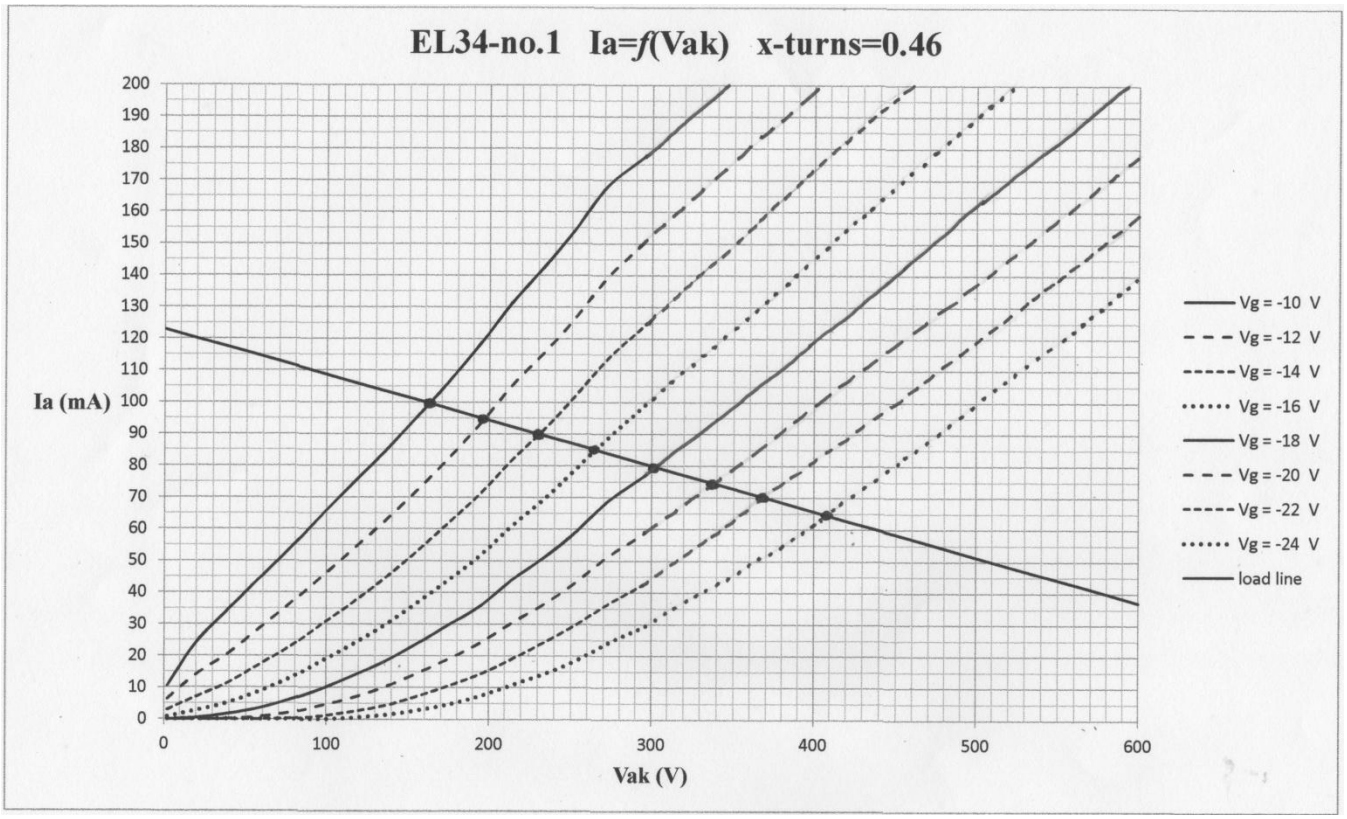

EL34-no.1 Ia=f(Vak) x-turns=0.11
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -10 V
Vg = -12 V
Vg = -14 V
Vg = -16 V
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
load line

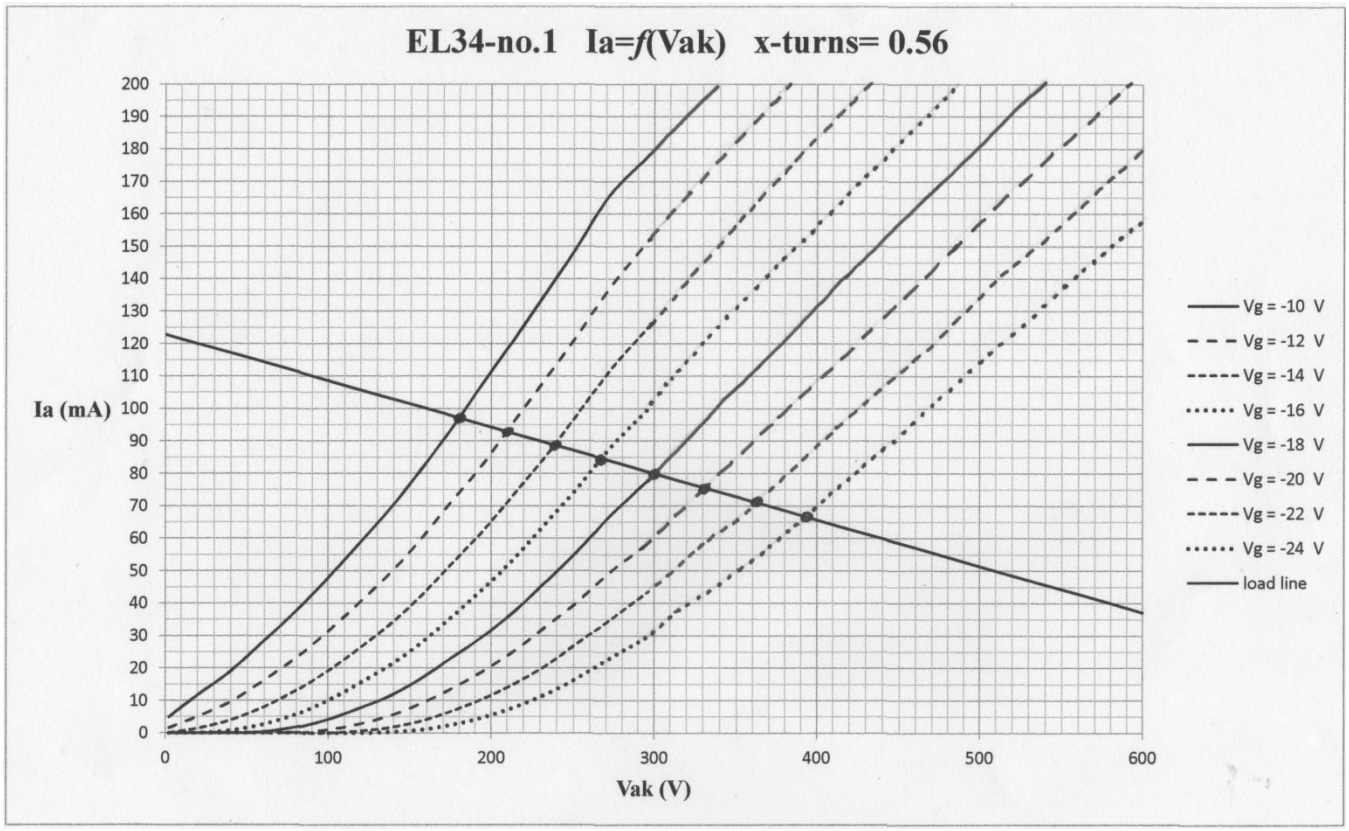

EL34-no.1 Ia=f(Vak) x-turns=0.17
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -10 V
Vg = -12 V
Vg = -14 V
Vg = -16 V
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
load line

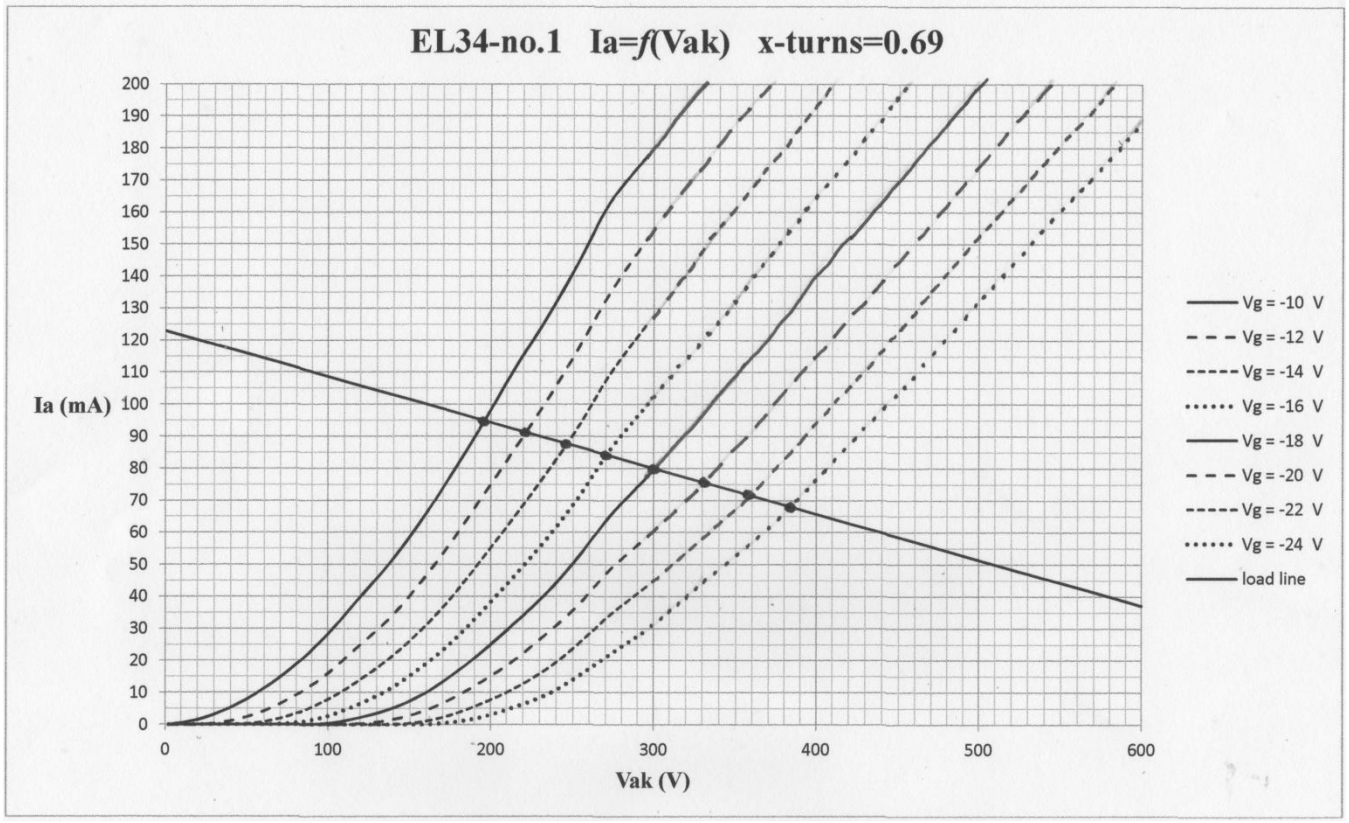

EL34-no.1 Ia=f(Vak) x-turns=0.23
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -10 V
Vg = -12 V
Vg = -14 V
Vg = -16 V
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
load line

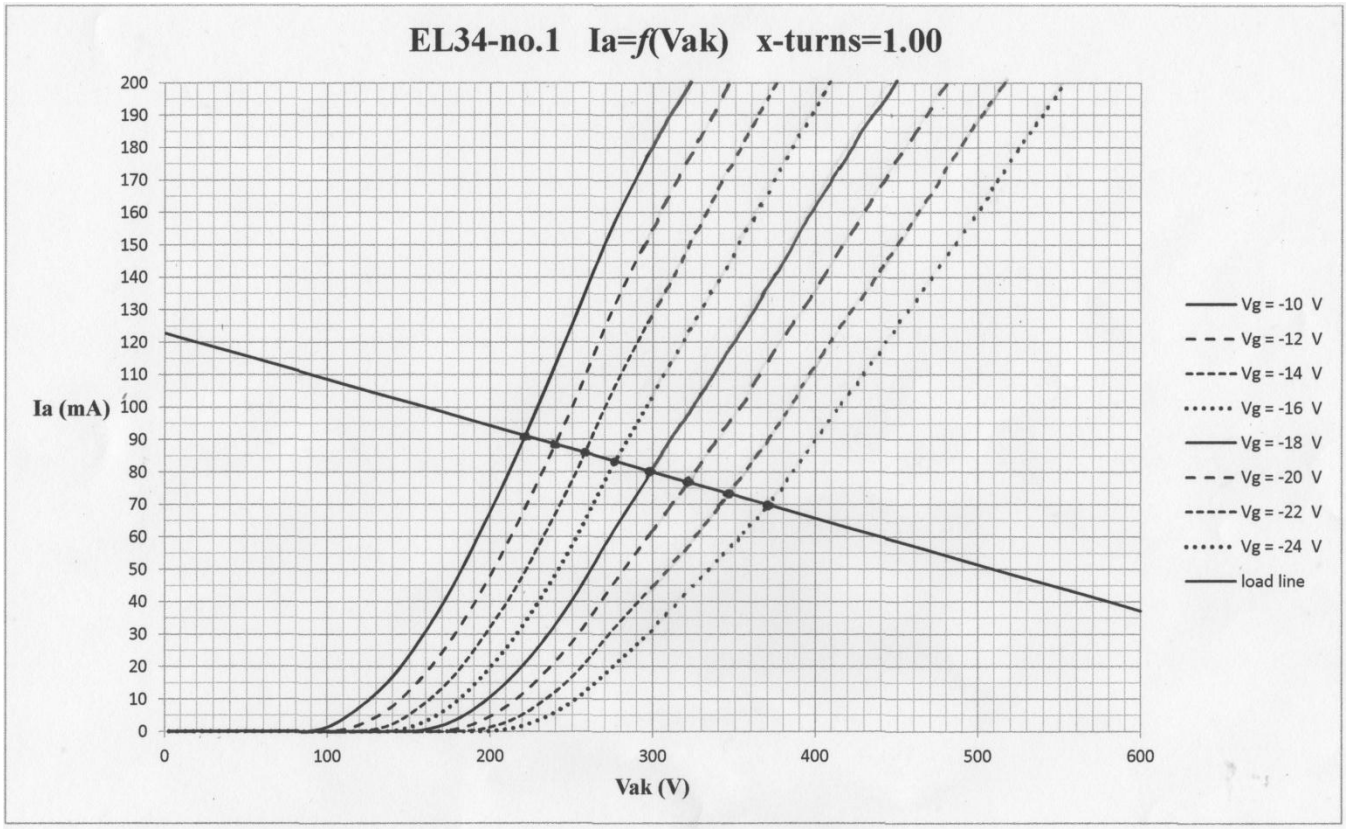

EL34-no.1 Ia=f(Vak) x-turns=0.30
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -10 V
Vg = -12 V
Vg = -14 V
Vg = -16 V
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
load line


EL34-no.1 Ia=f(Vak) x-turns=0.36
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -10 V
Vg = -12 V
Vg = -14 V
Vg = -16 V
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
load line


EL34-no.1 Ia=f(Vak) x-turns=0.46
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -10 V
Vg = -12 V
Vg = -14 V
Vg = -16 V
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
load line

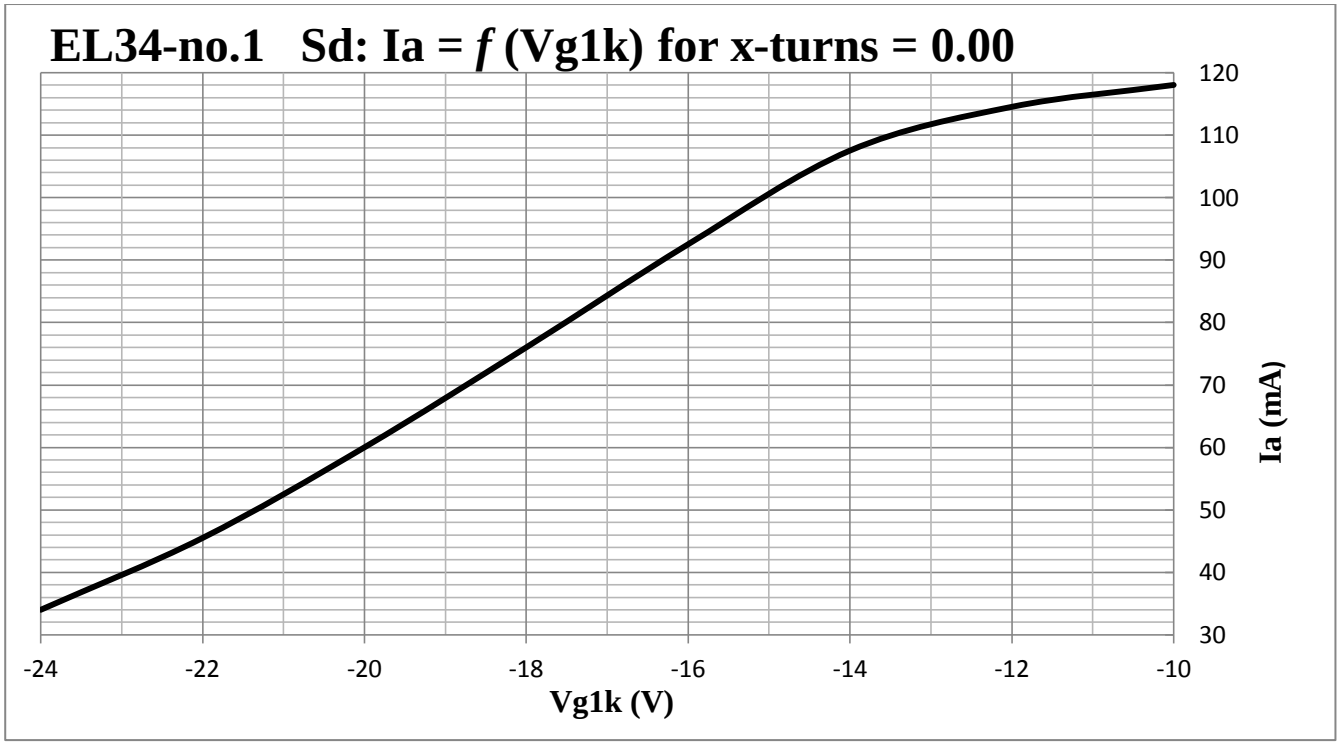

EL34-no.1 Ia=f(Vak) x-turns= 0.56
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -10 V
Vg = -12 V
Vg = -14 V
Vg = -16 V
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
load line

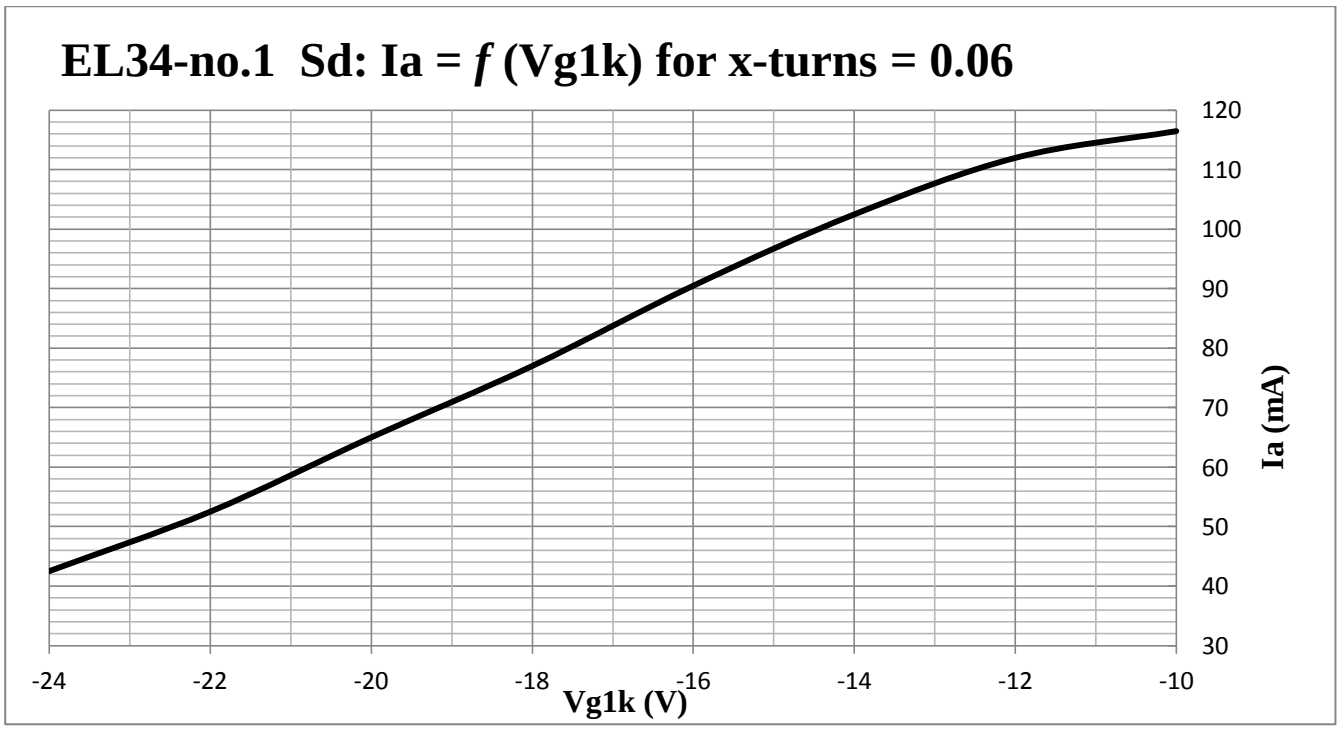

EL34-no.1 Ia=f(Vak) x-turns=0.69
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -10 V
Vg = -12 V
Vg = -14 V
Vg = -16 V
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
load line

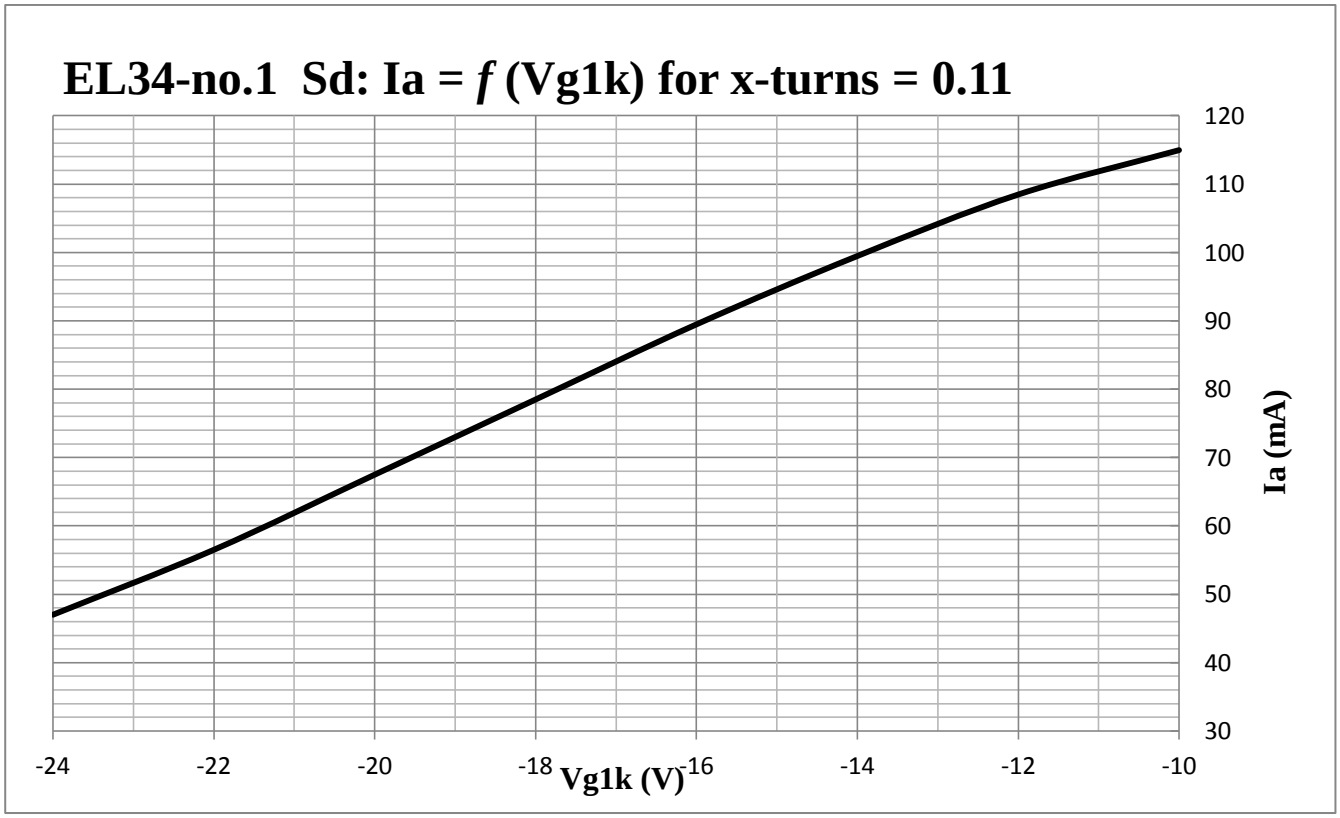

EL34-no.1 Ia=f(Vak) x-turns=1.00
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -10 V
Vg = -12 V
Vg = -14 V
Vg = -16 V
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
load line

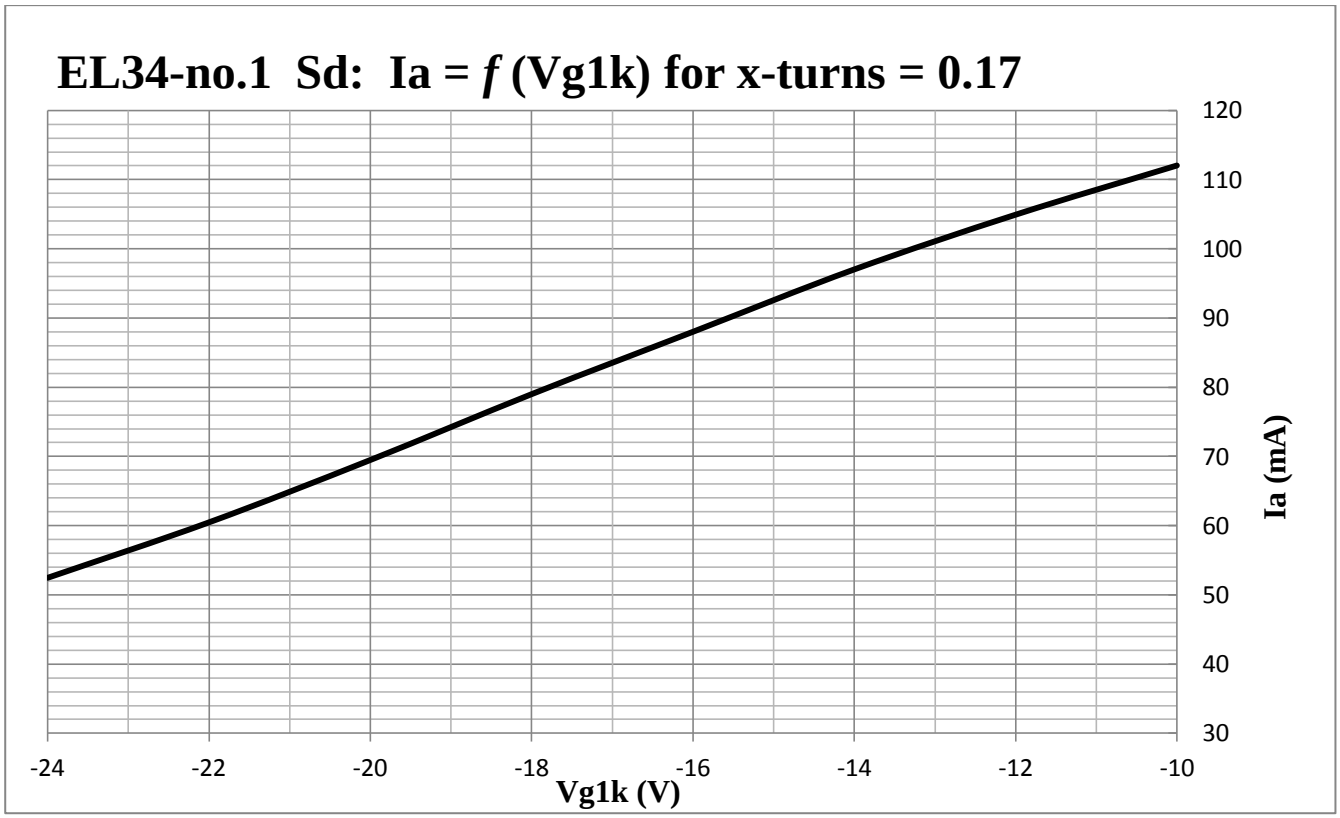
APPENDIX D

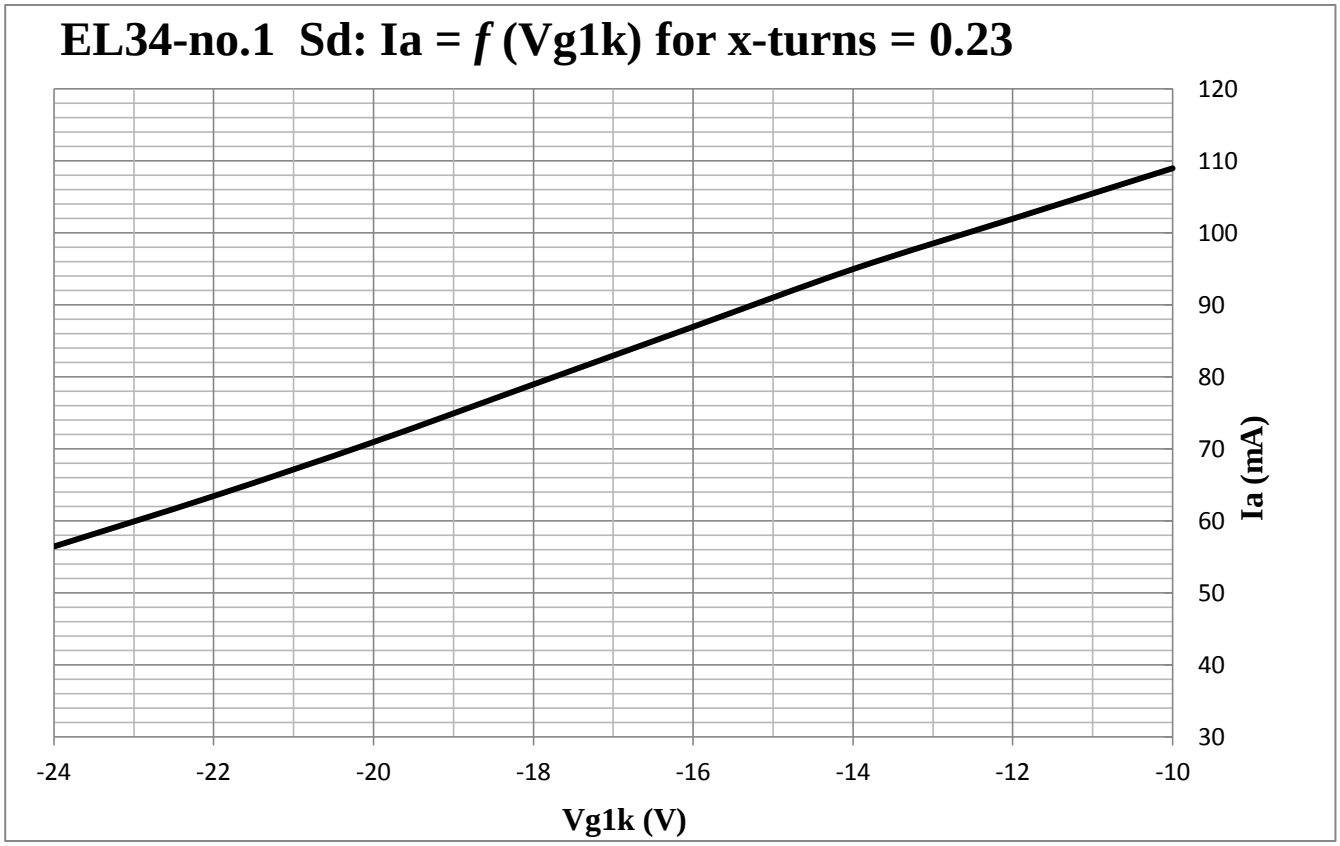
Constructed dynamic transconductance characteristics of EL34 for several screen grid taps.

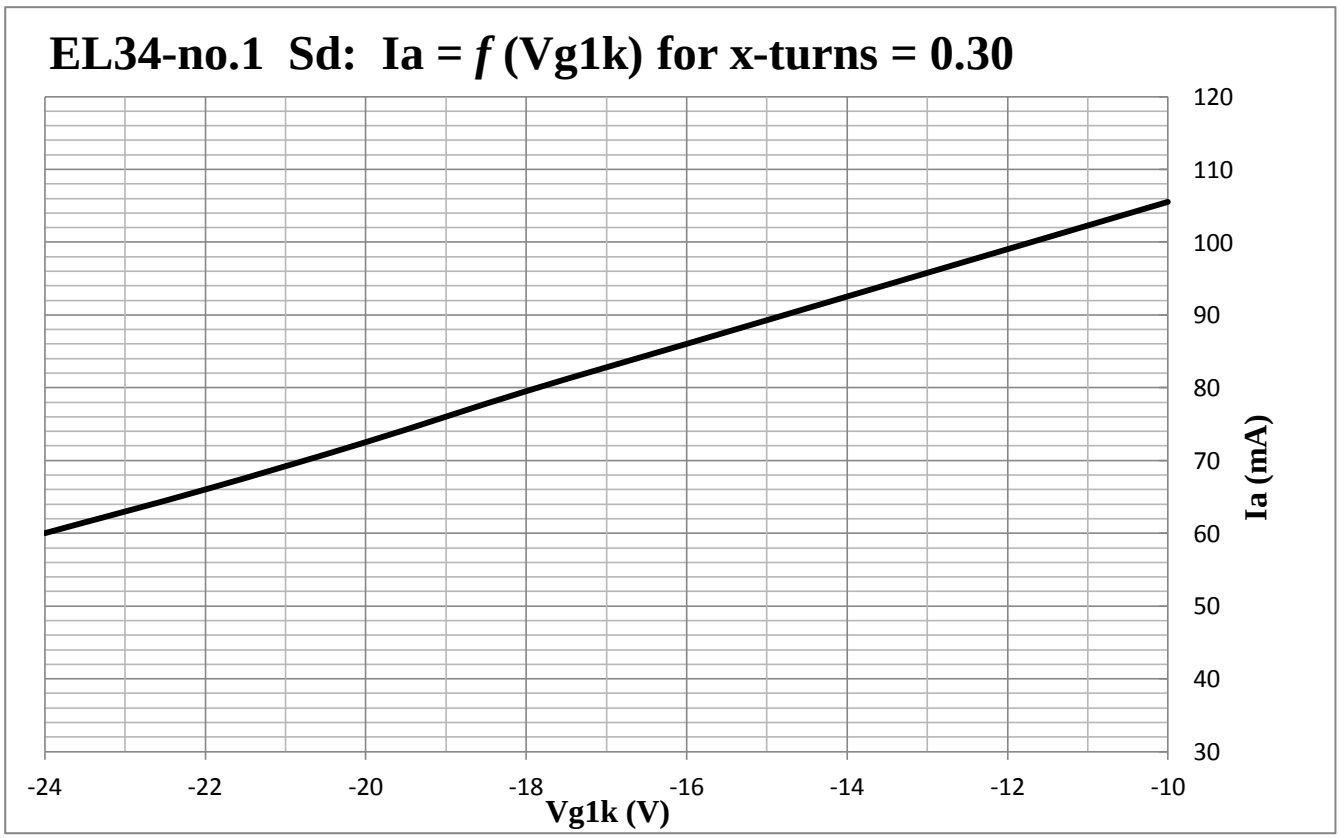


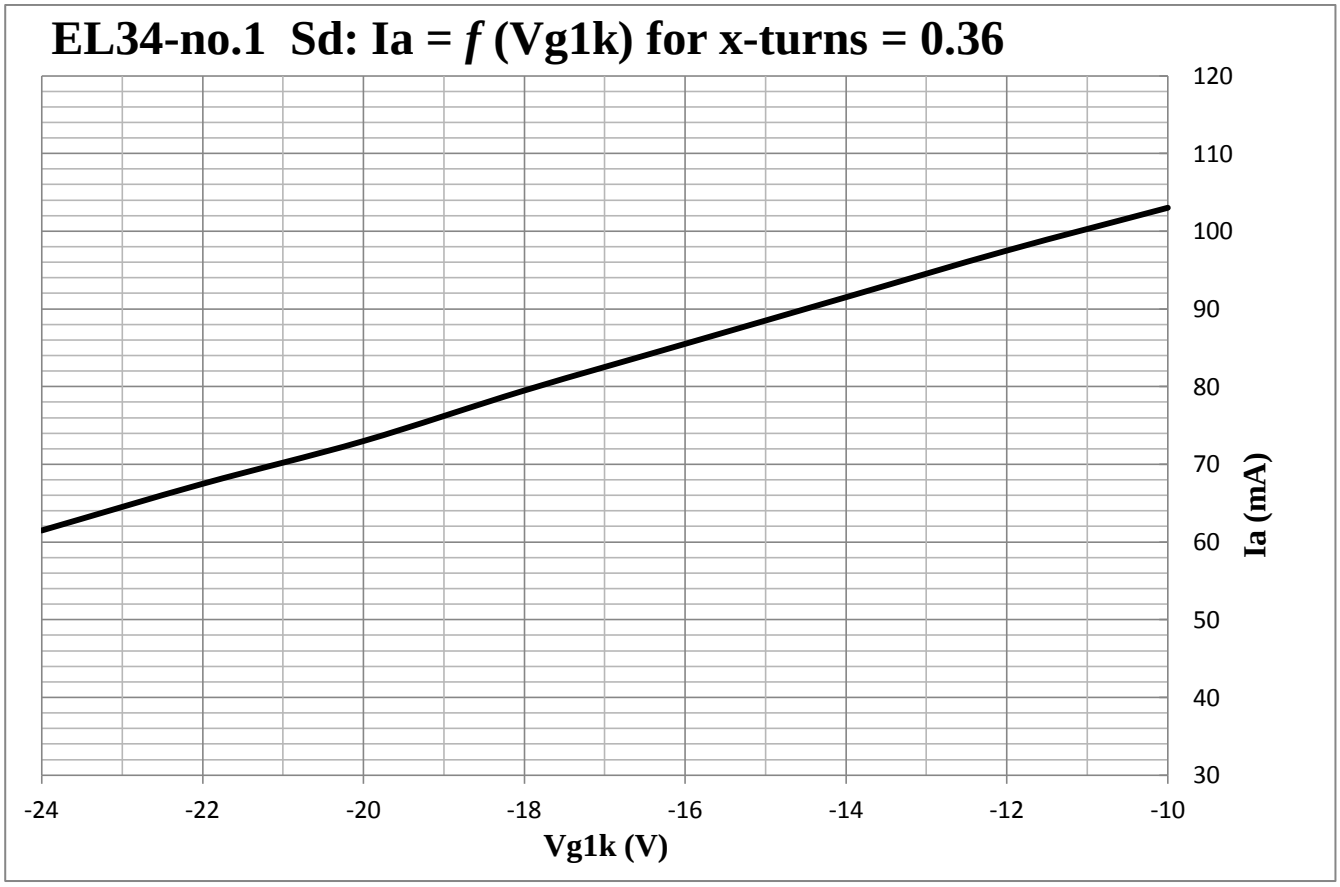


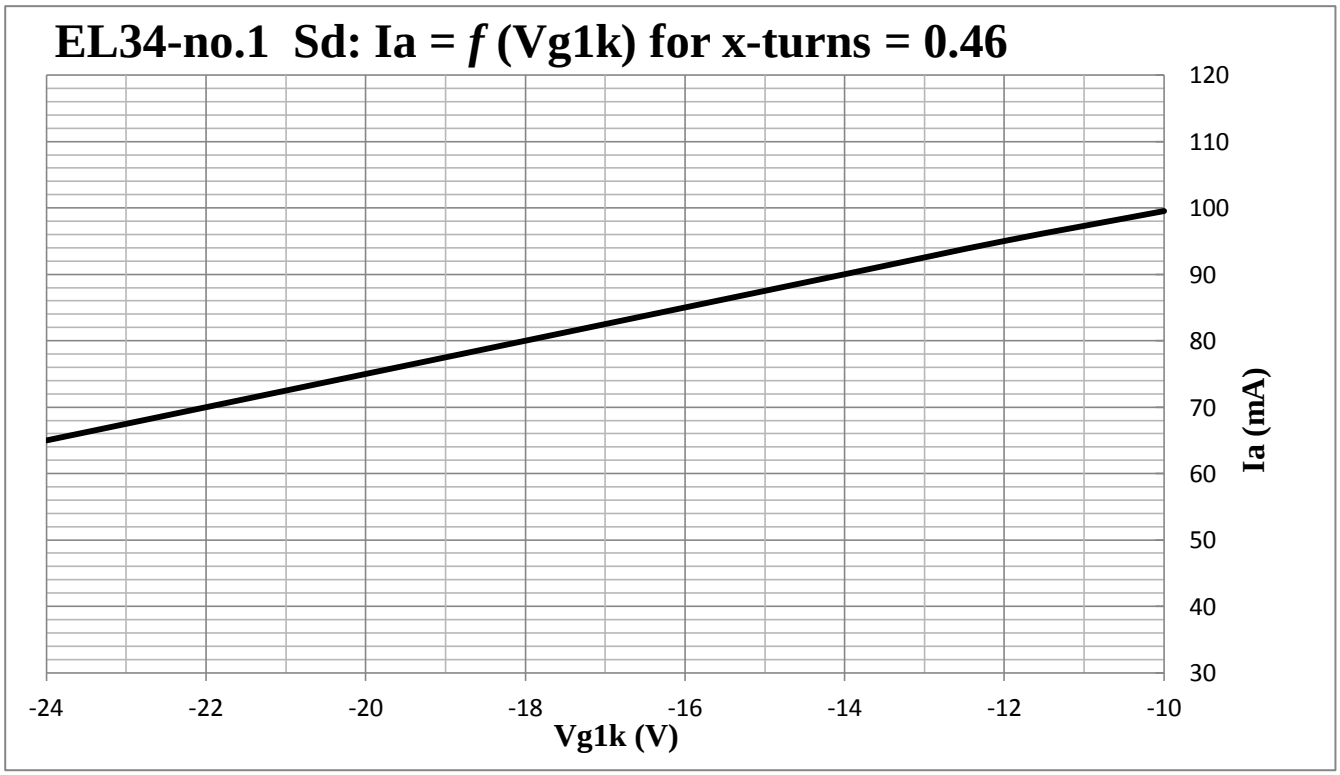

EL34-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.11
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-24
-22
-20
-18
-16
-14
-12
-10
Vg1k (V)

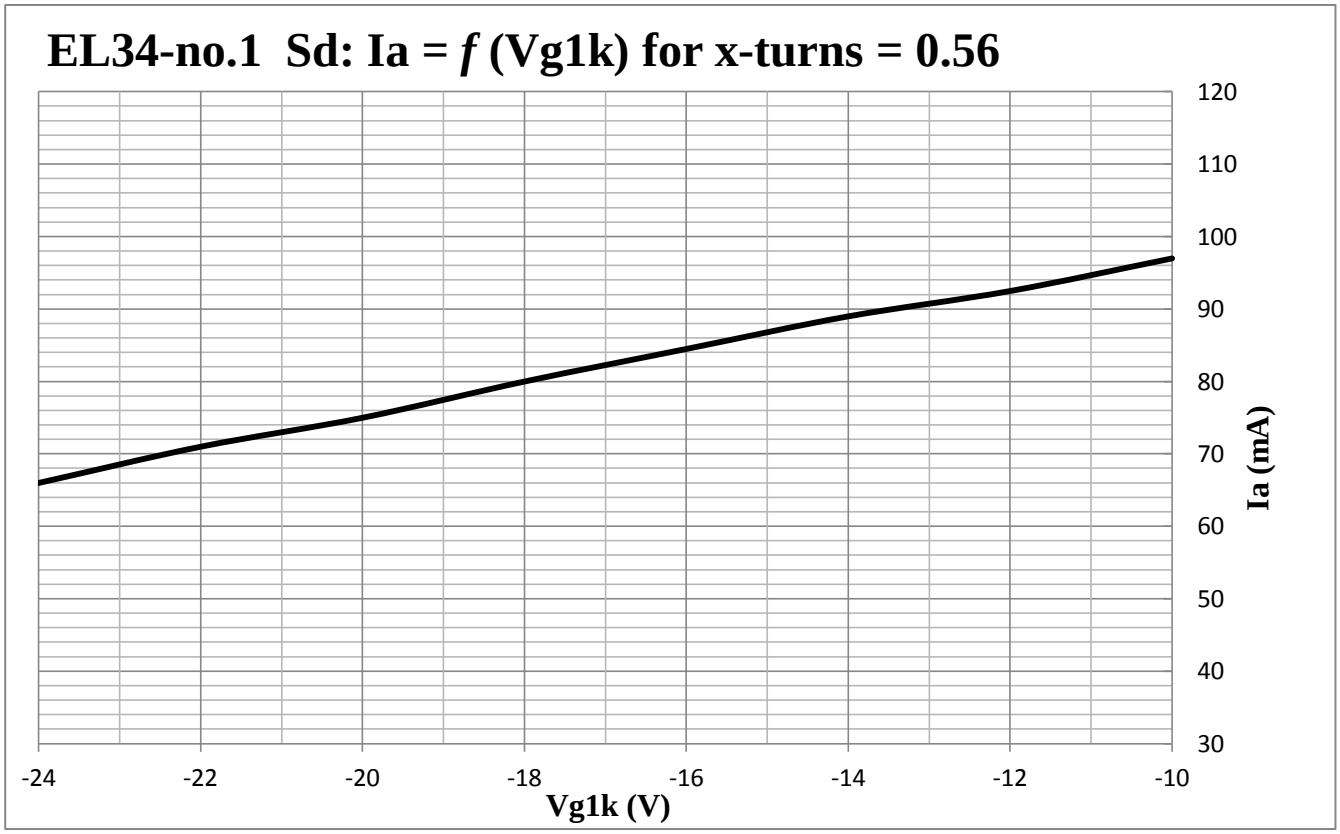

EL34-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.17
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-24
-22
-20
-18
-16
-14
-12
-10
Vg1k (V)

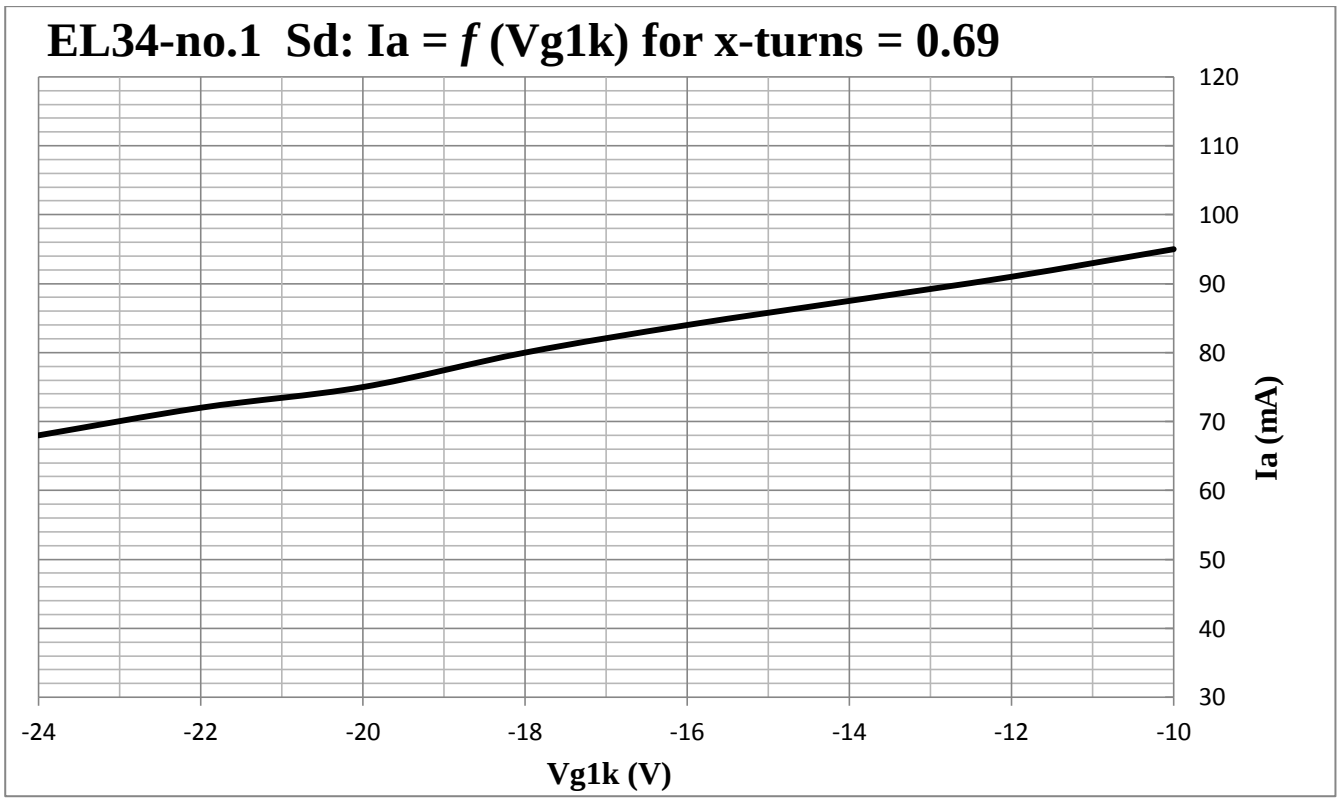

EL34-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.23
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-24
-22
-20
-18
-16
-14
-12
-10
Vg1k (V)

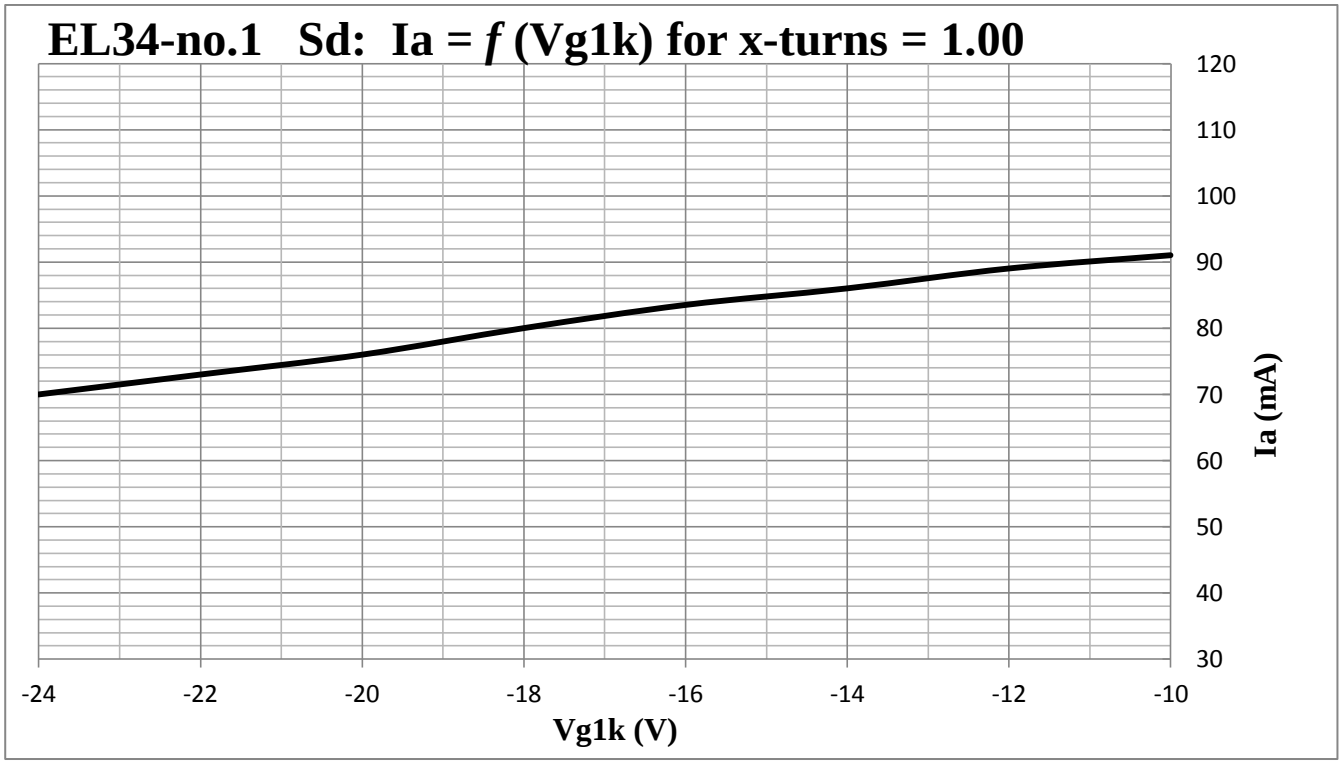

EL34-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.30
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-24
-22
-20
-18
-16
-14
-12
-10
Vg1k (V)


EL34-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.36
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-24
-22
-20
-18
-16
-14
-12
-10
Vg1k (V)

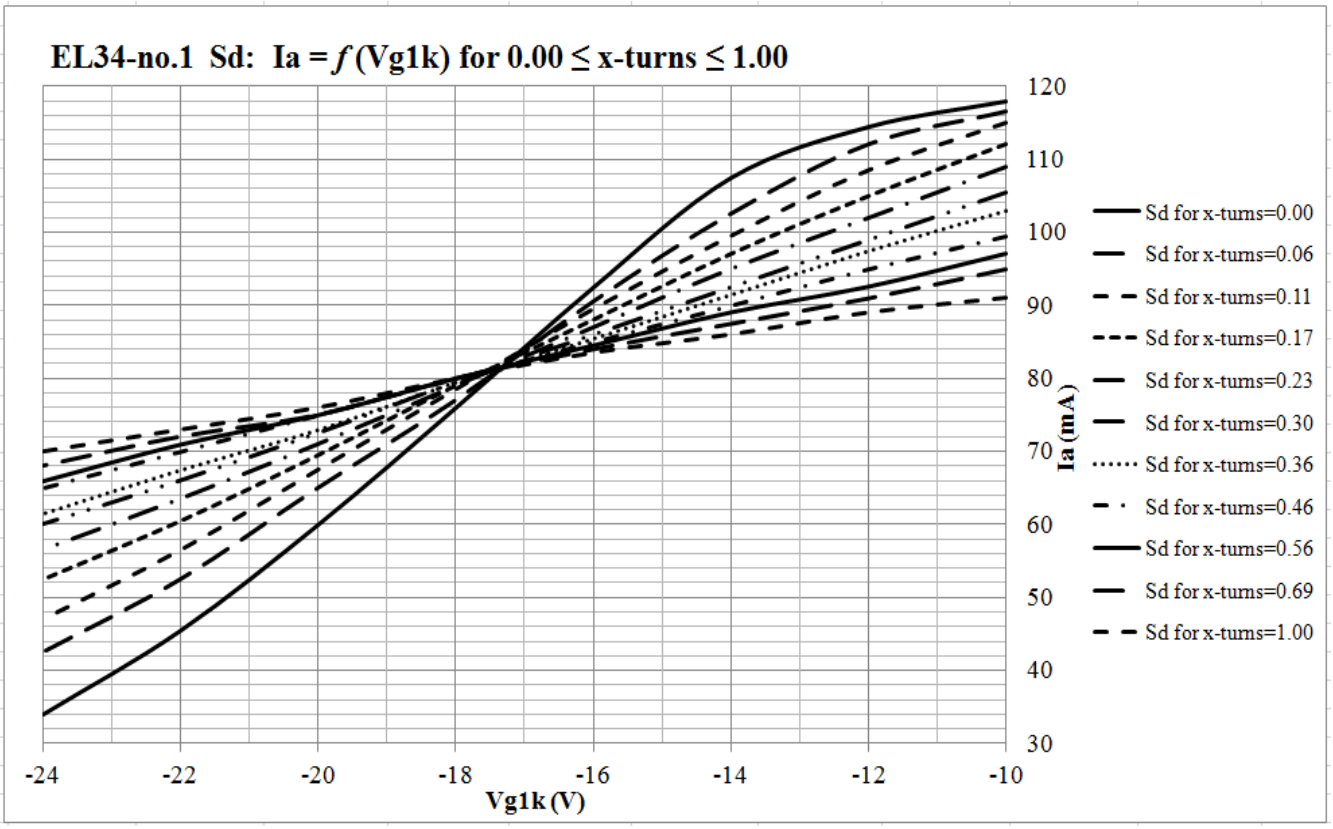

EL34-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.46
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-24
-22
-20
-18
-16
-14
-12
-10
Vg1k (V)


EL34-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.56
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-24
-22
-20
-18
-16
-14
-12
-10
Vg1k (V)


EL34-no.1 Sd: Ia = f (Vg1k) for x-turns = 0.69
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-24
-22
-20
-18
-16
-14
-12
-10
Vg1k (V)

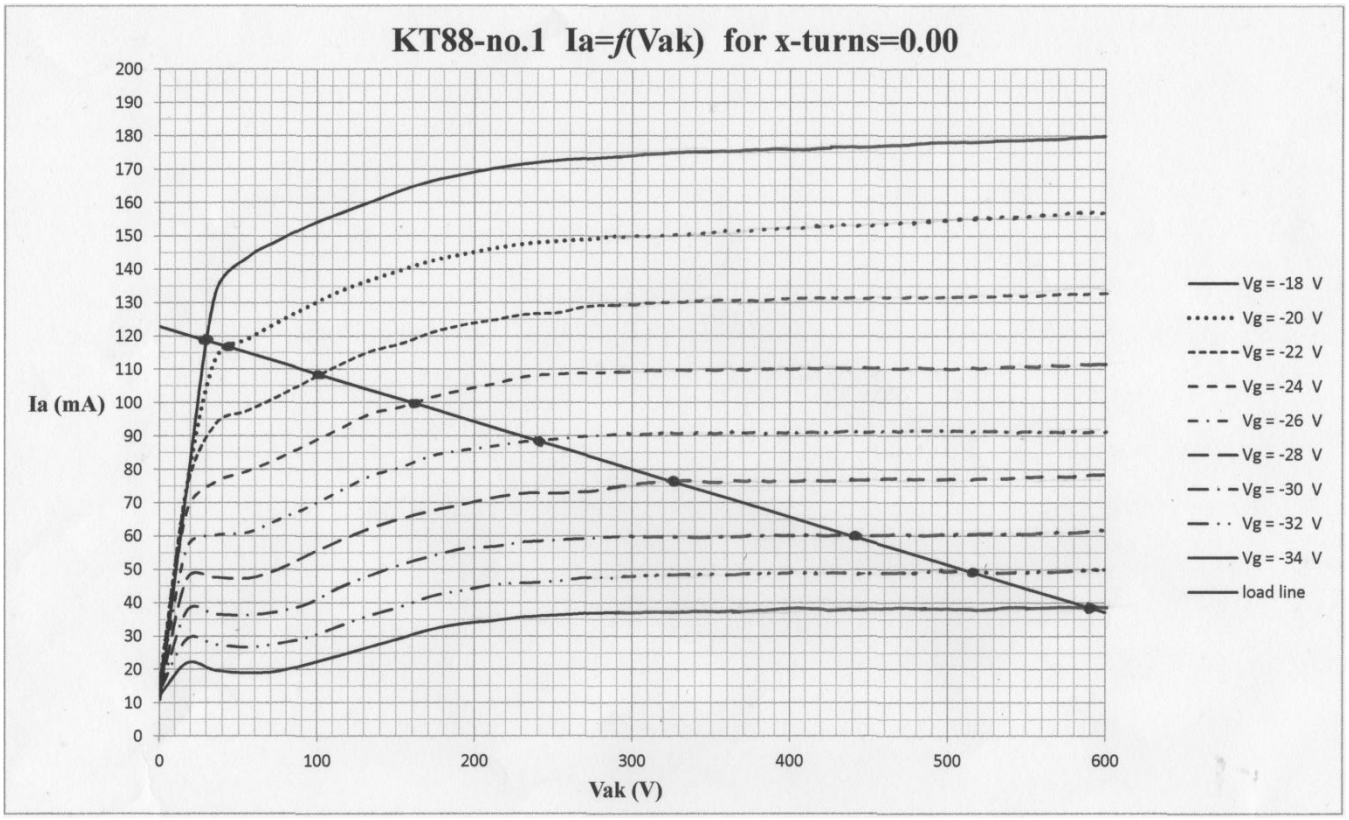


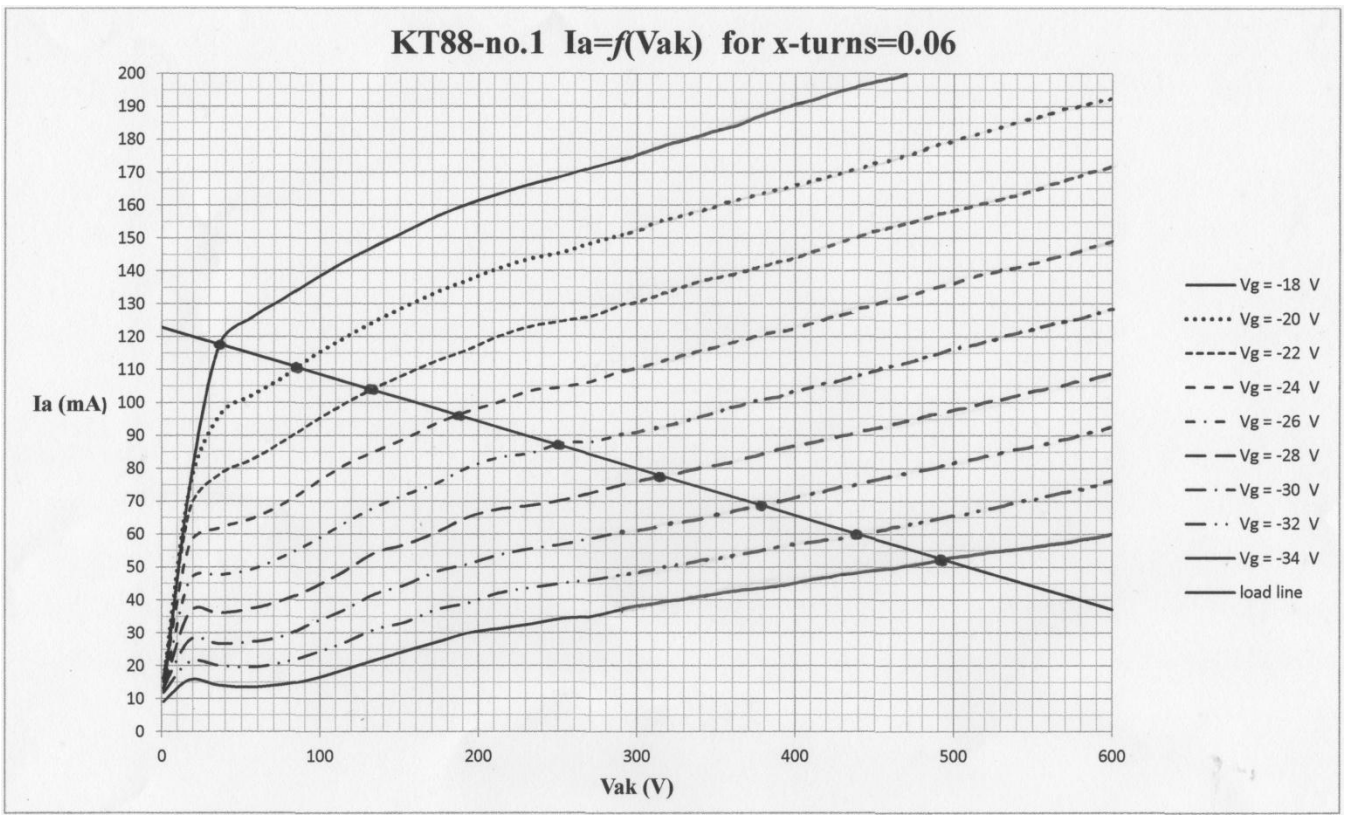
And finally all these S_d together in one transconductance characteristic.

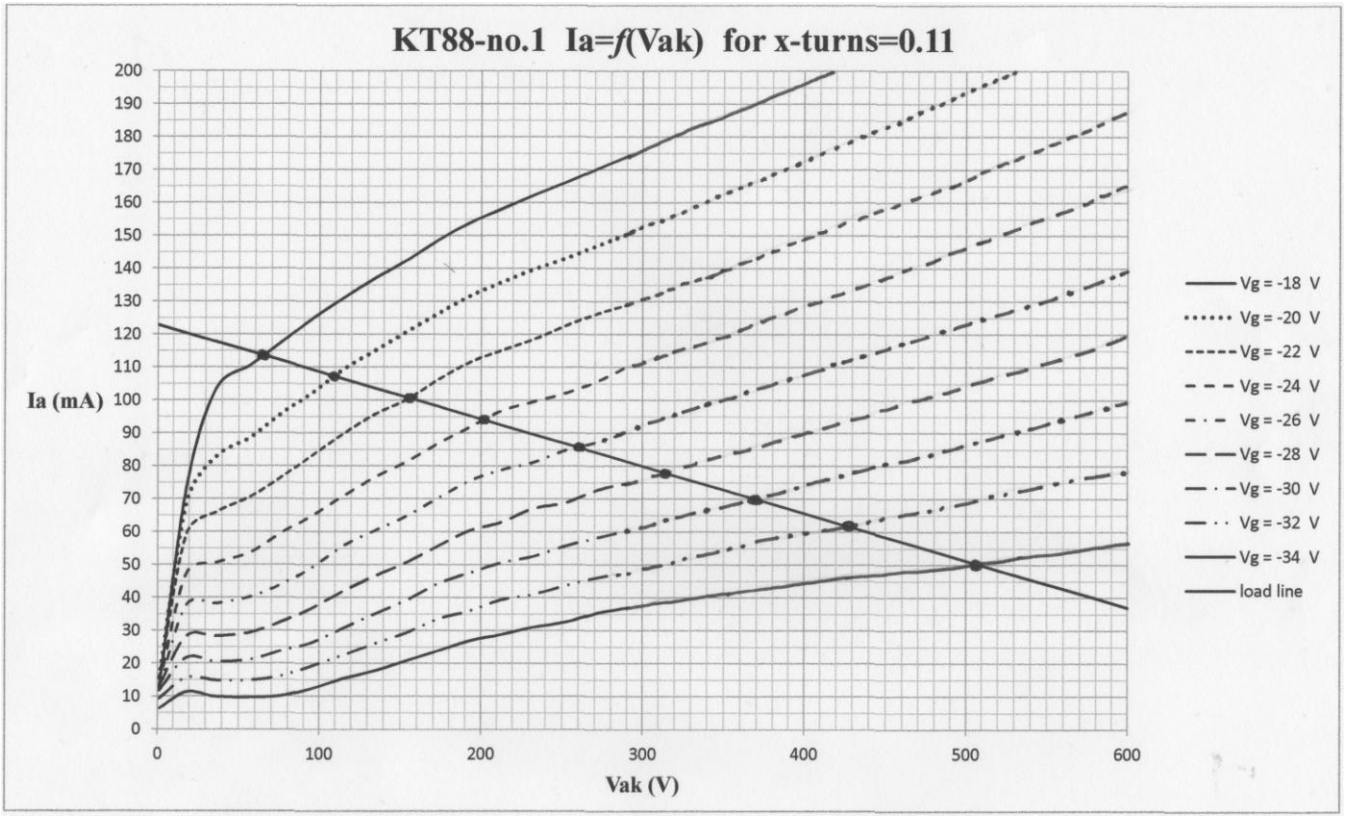


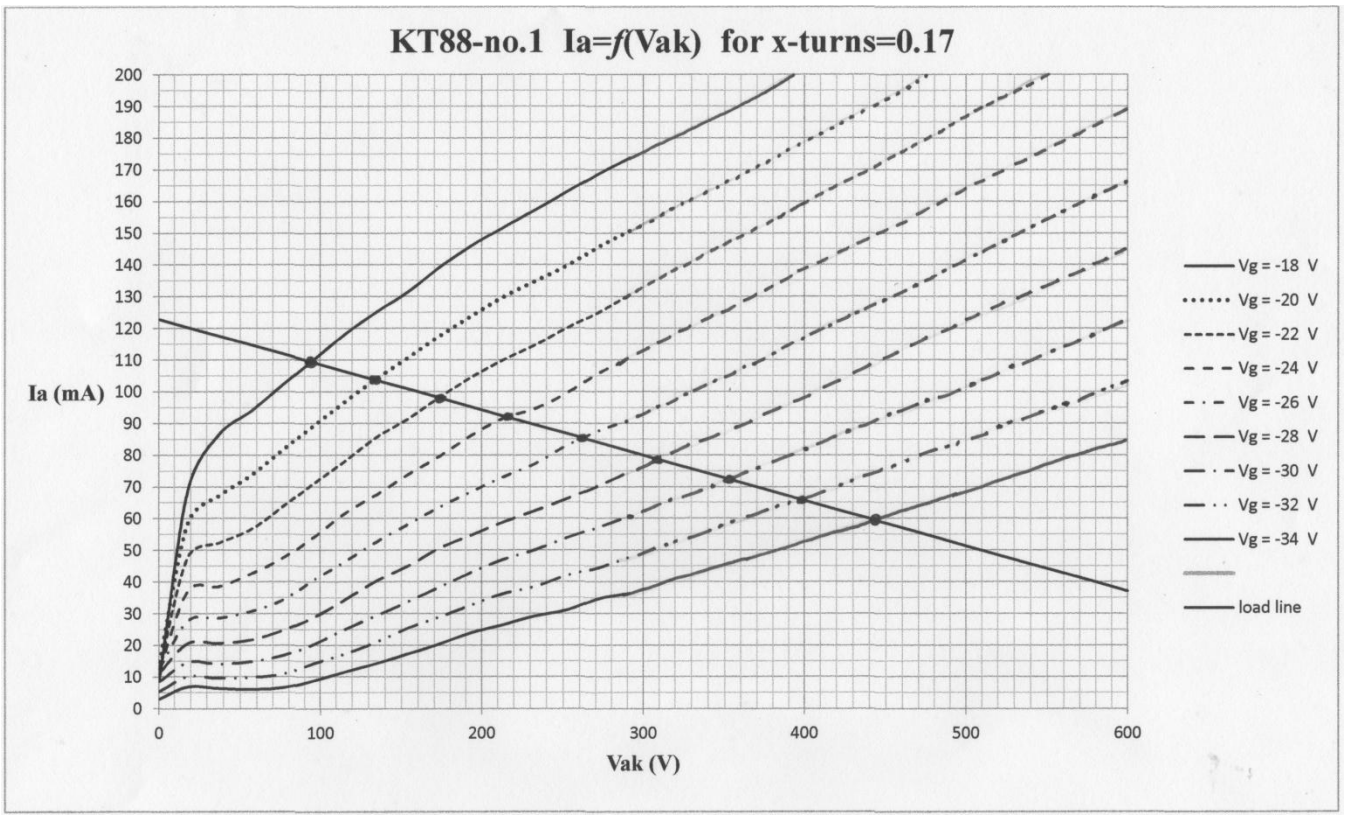
APPENDIX E

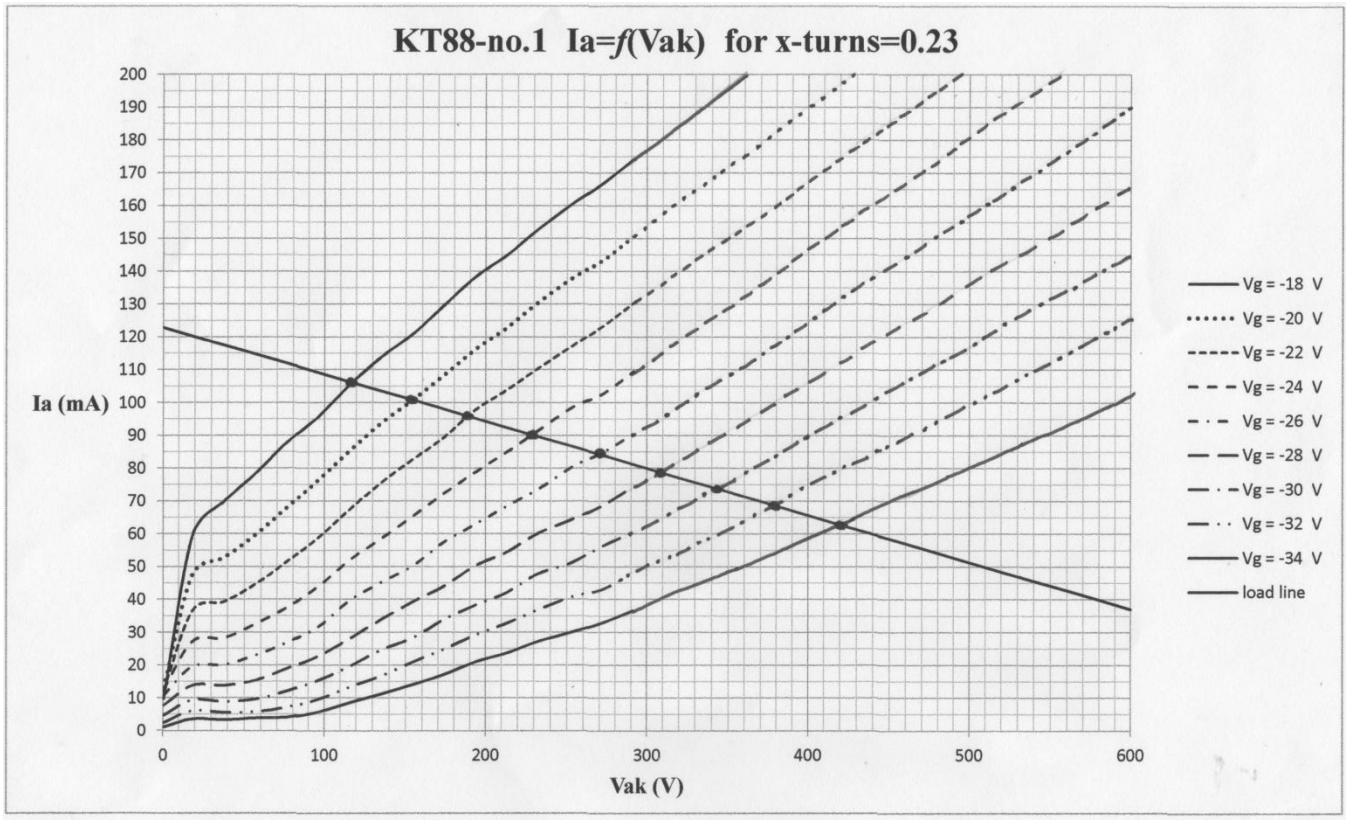
Measured with the µTracer and extrapolated anode characteristics of KT88 for several screen grid taps. Load line for KT88 goes through working point $V_{ak,w}$ = 300V, $I_{a,w}$ = 80mA and $V_{g1k,w} \approx -26.4$V.

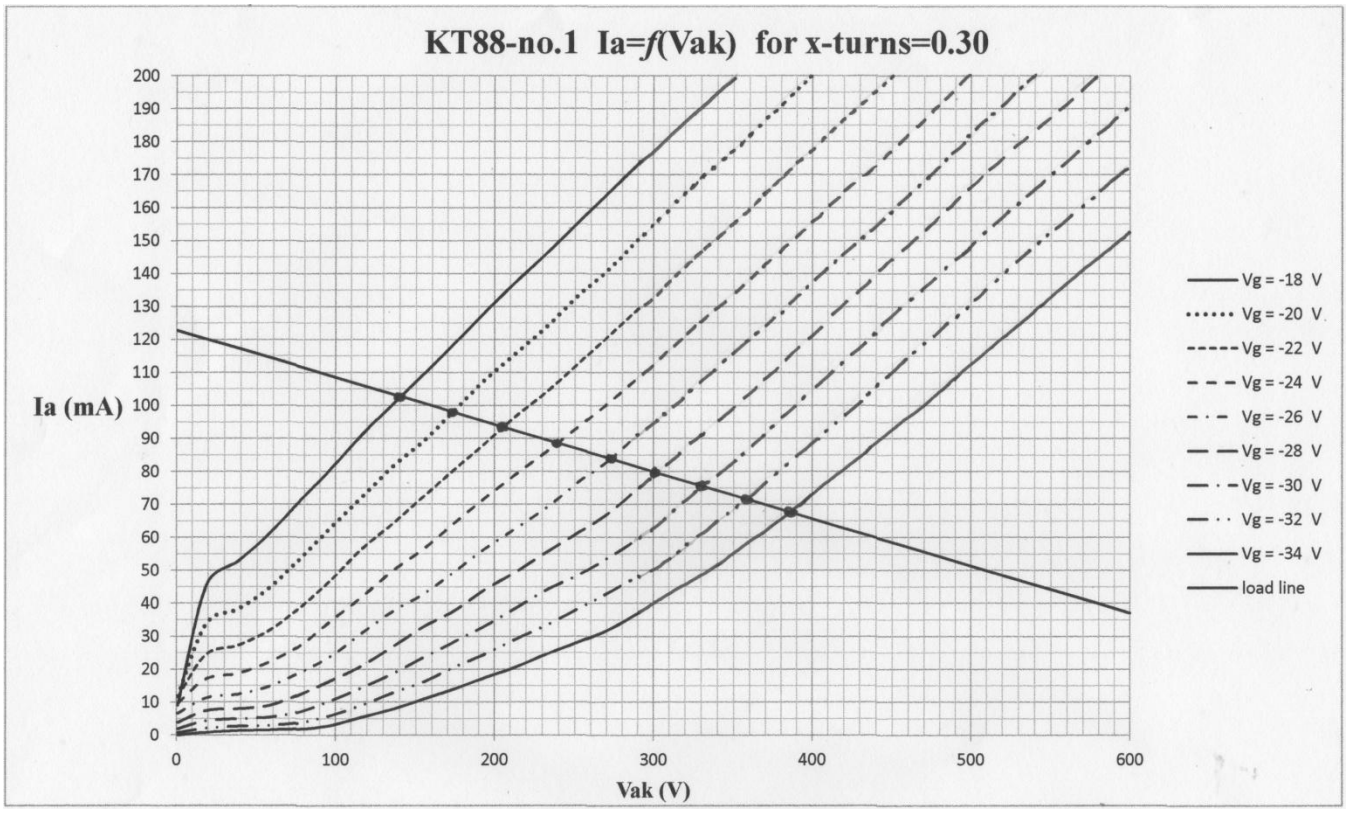


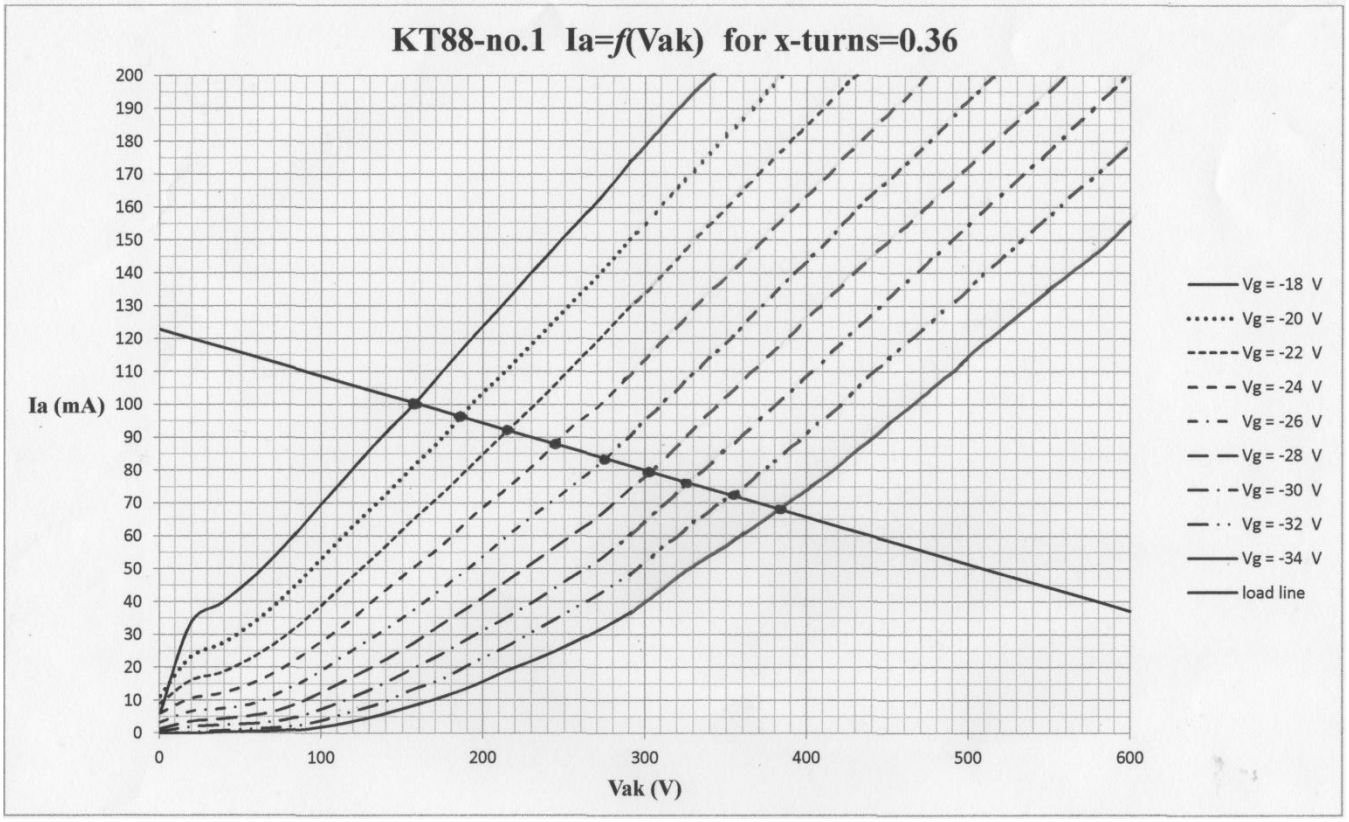


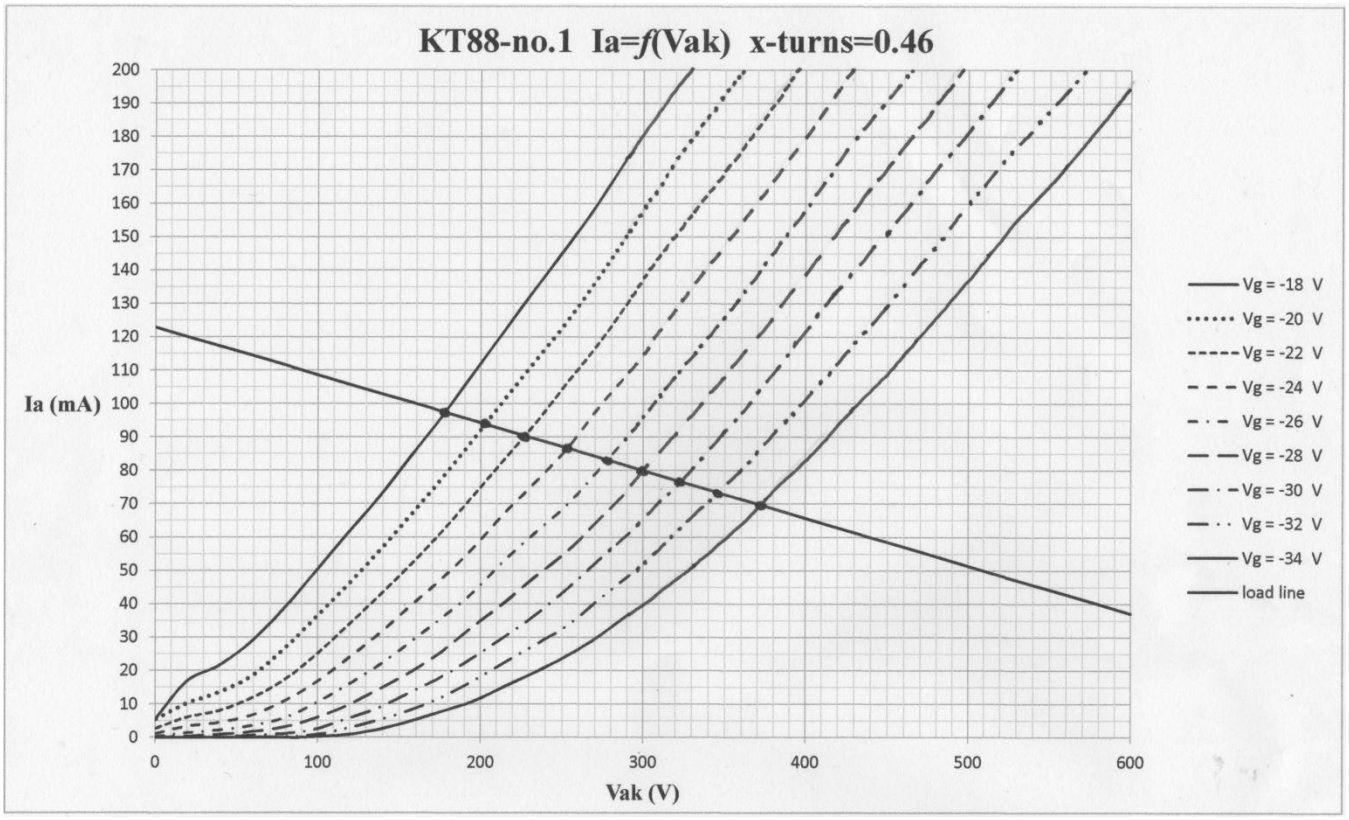

KT88-no.1 Ia=f(Vak) for x-turns=0.11
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
Vg = -26 V
Vg = -28 V
Vg = -30 V
Vg = -32 V
Vg = -34 V
load line

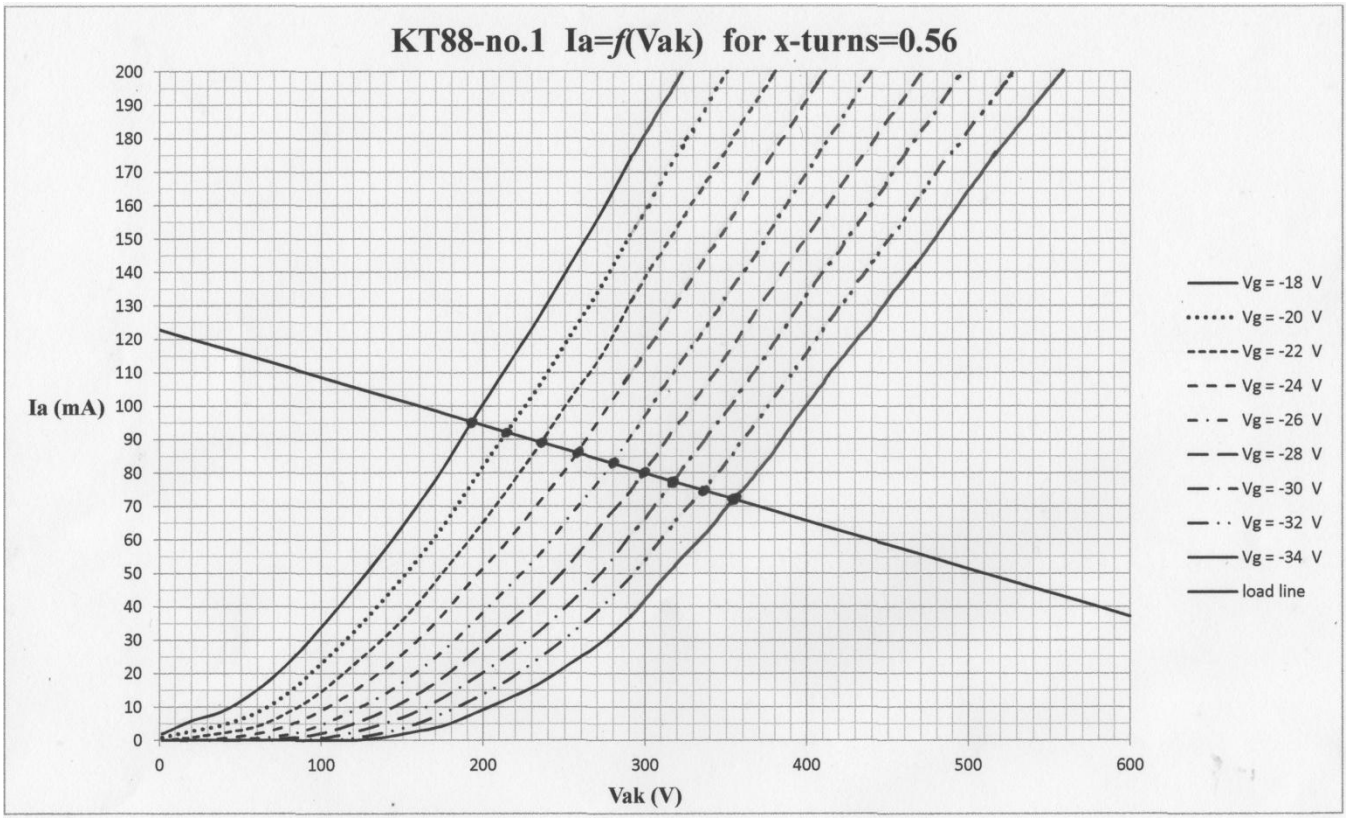

KT88-no.1 Ia=f(Vak) for x-turns=0.17
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
Vg = -26 V
Vg = -28 V
Vg = -30 V
Vg = -32 V
Vg = -34 V
load line

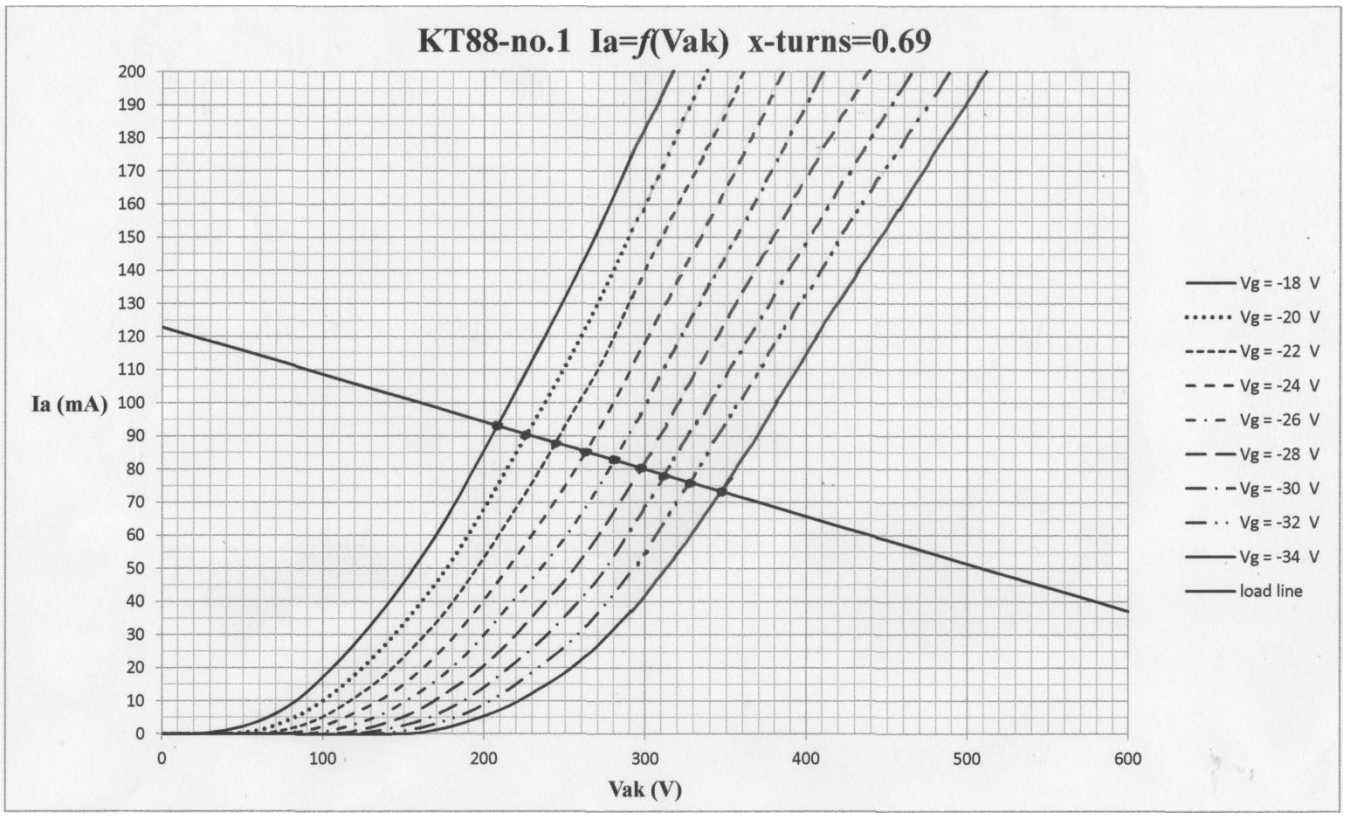

KT88-no.1 Ia=f(Vak) for x-turns=0.23
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
Vg = -26 V
Vg = -28 V
Vg = -30 V
Vg = -32 V
Vg = -34 V
load line

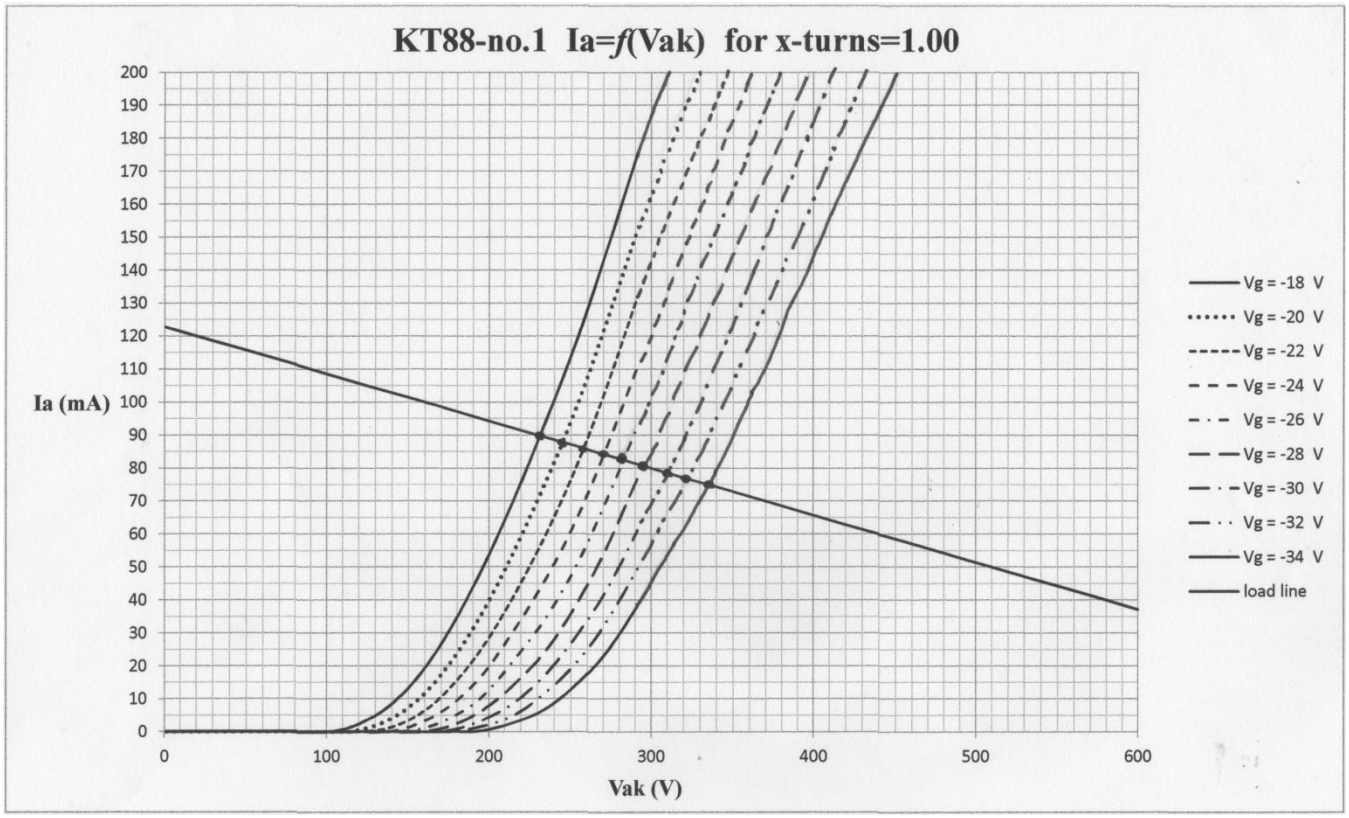

KT88-no.1 Ia=f(Vak) for x-turns=0.30
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
Vg = -26 V
Vg = -28 V
Vg = -30 V
Vg = -32 V
Vg = -34 V
load line


KT88-no.1 Ia=f(Vak) for x-turns=0.36
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
Vg = -26 V
Vg = -28 V
Vg = -30 V
Vg = -32 V
Vg = -34 V
load line


KT88-no.1 Ia=f(Vak) x-turns=0.46
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
Vg = -26 V
Vg = -28 V
Vg = -30 V
Vg = -32 V
Vg = -34 V
load line

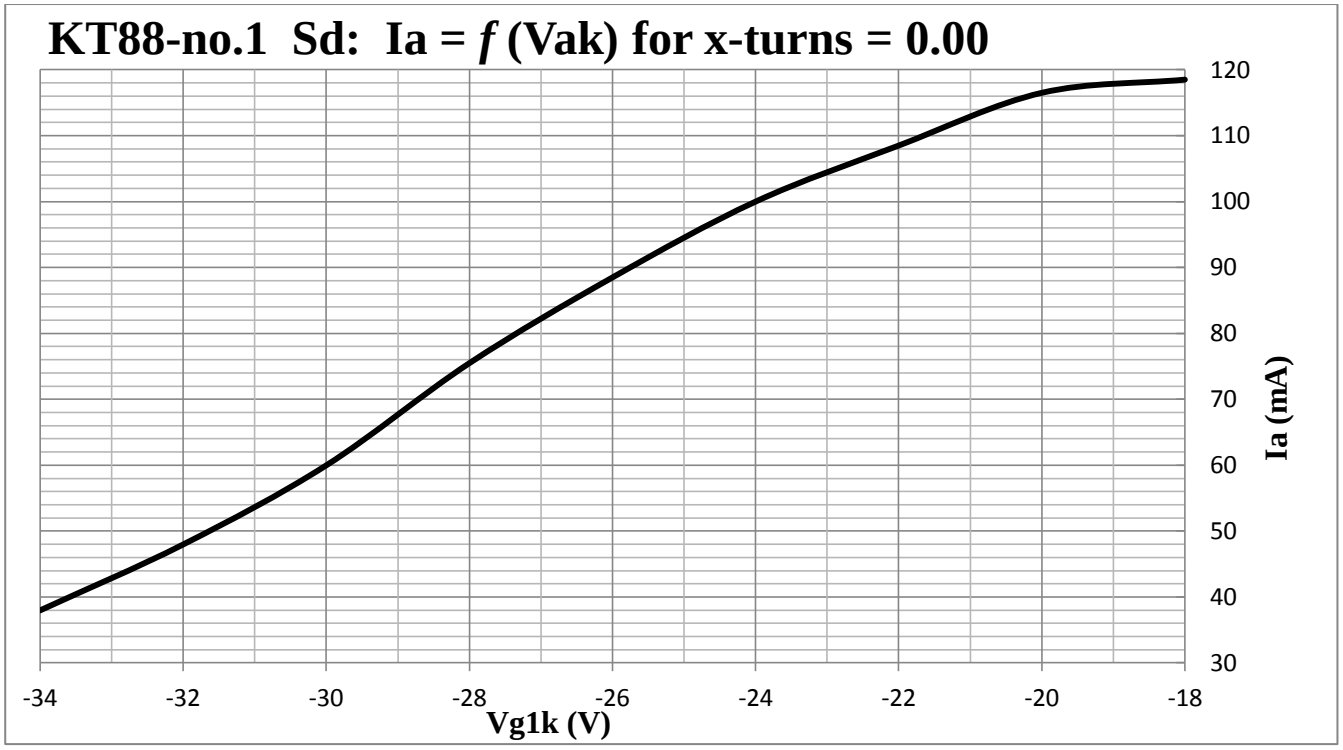

KT88-no.1 Ia=f(Vak) for x-turns=0.56
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
Vg = -26 V
Vg = -28 V
Vg = -30 V
Vg = -32 V
Vg = -34 V
load line

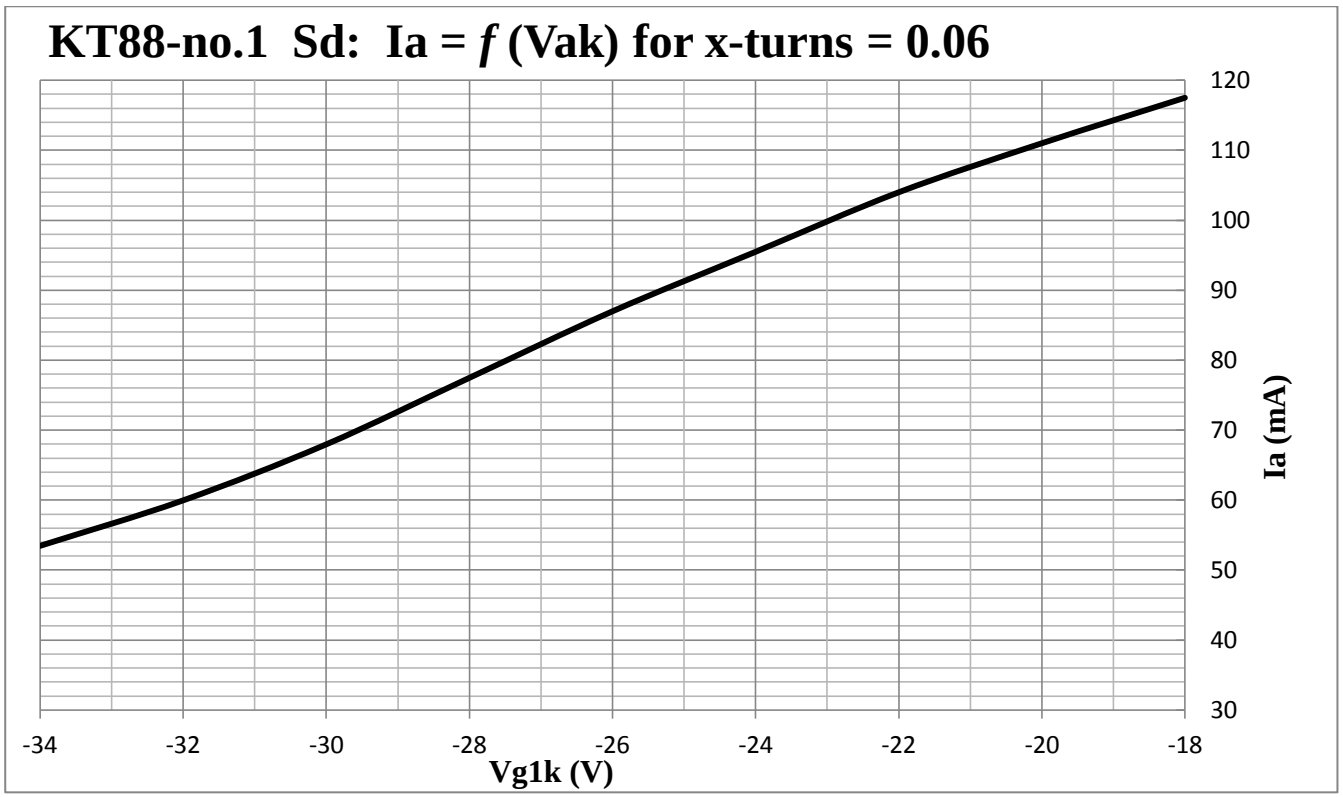

KT88-no.1 Ia=f(Vak) x-turns=0.69
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
Vg = -26 V
Vg = -28 V
Vg = -30 V
Vg = -32 V
Vg = -34 V
load line

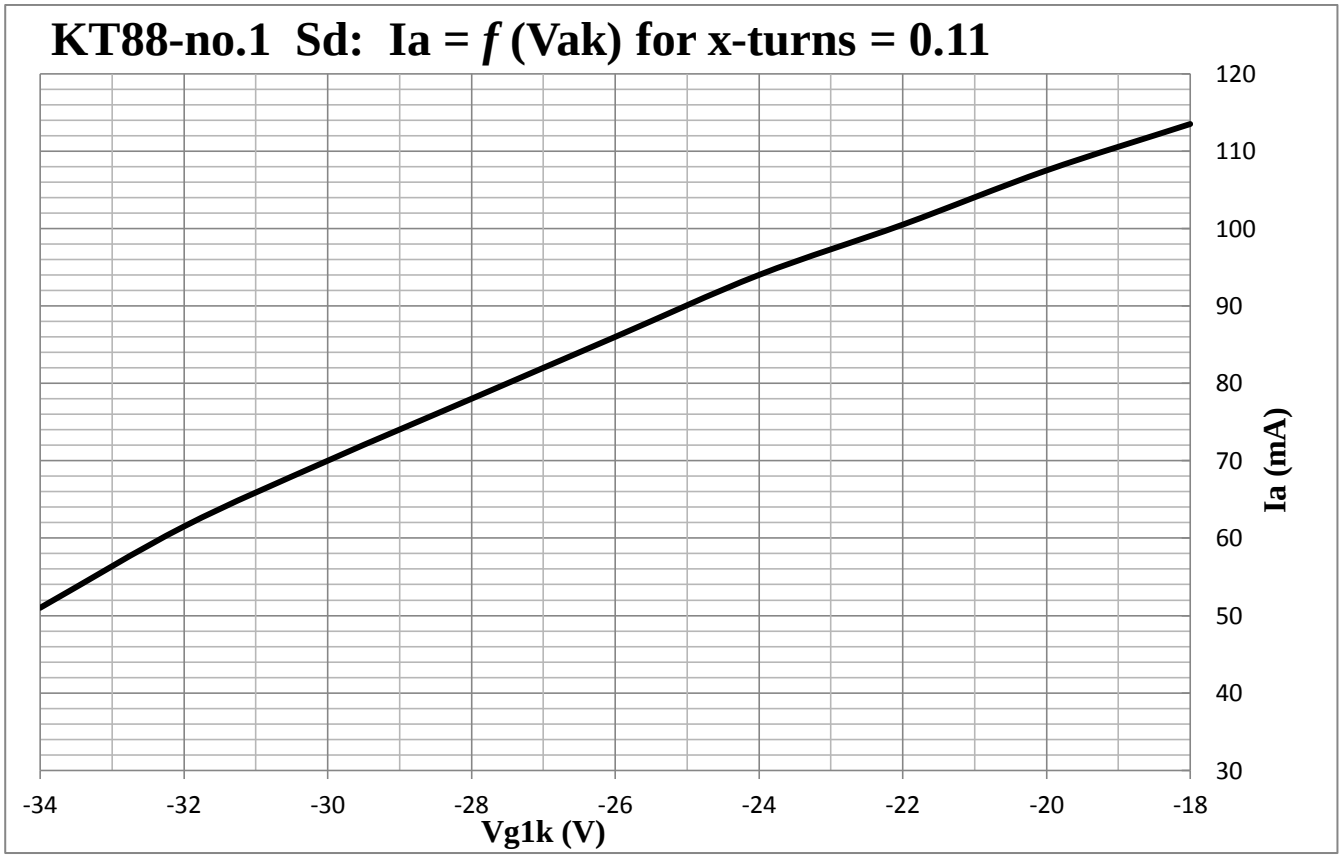

KT88-no.1 Ia=f(Vak) for x-turns=1.00
Ia (mA)
Vak (V)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
100
200
300
400
500
600
Vg = -18 V
Vg = -20 V
Vg = -22 V
Vg = -24 V
Vg = -26 V
Vg = -28 V
Vg = -30 V
Vg = -32 V
Vg = -34 V
load line

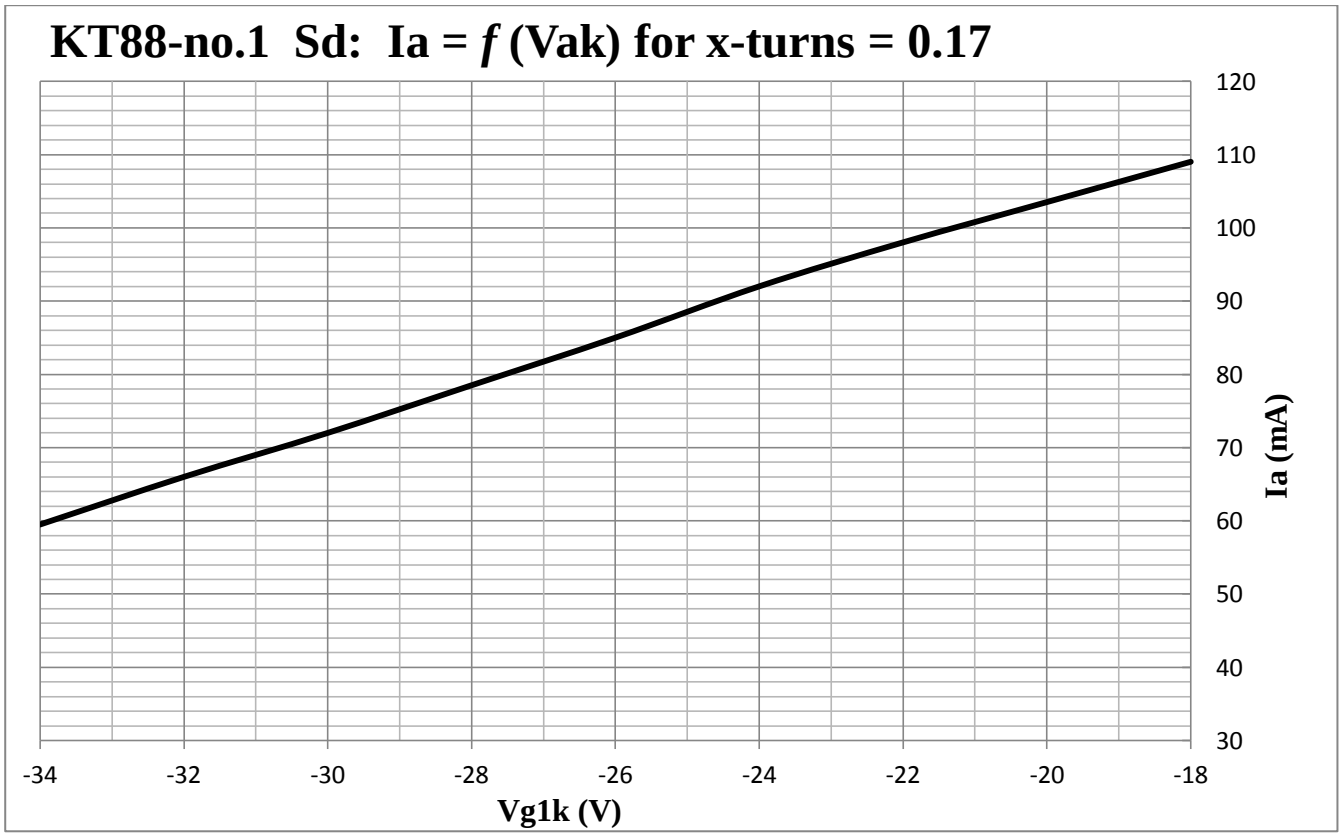
APPENDIX F

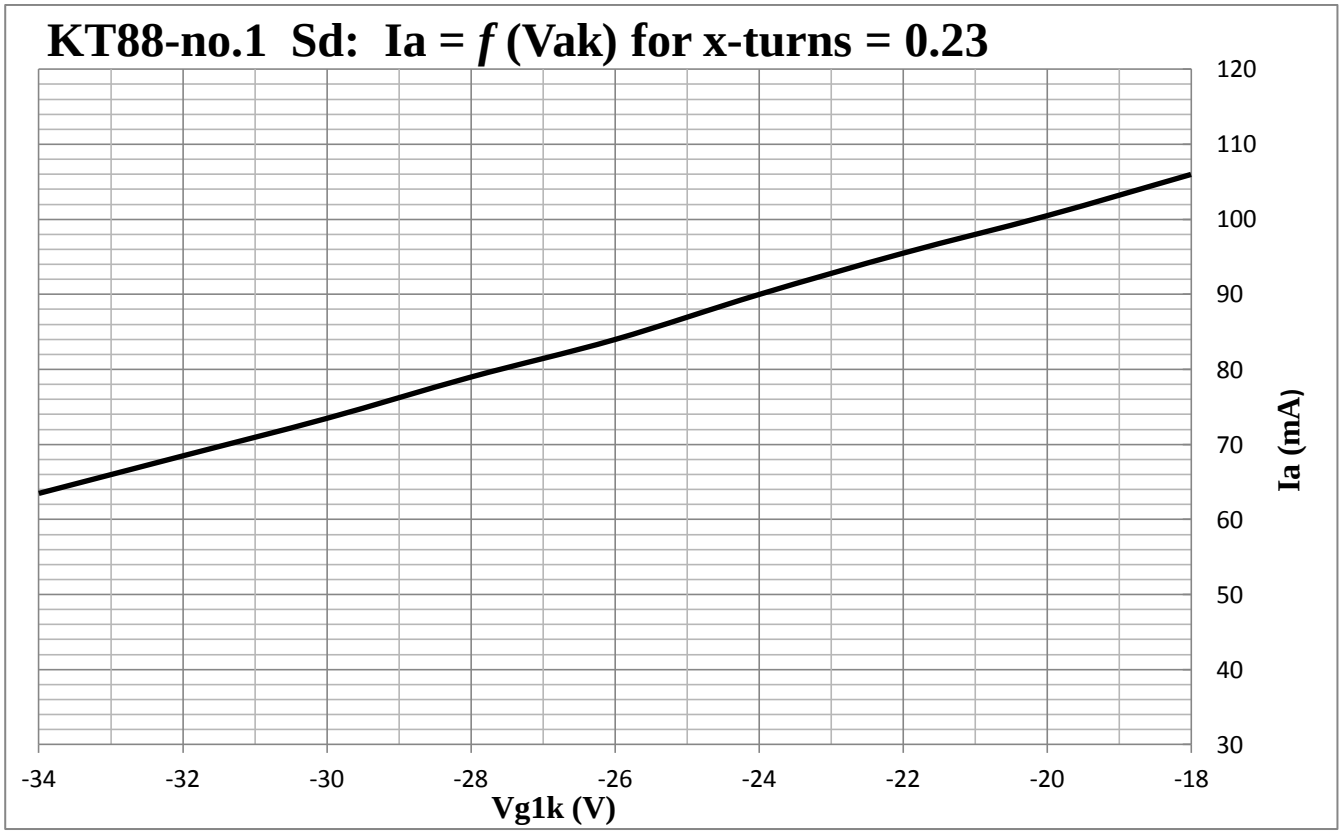
Constructed dynamic transconductance characteristics of KT88 for several screen grid tap.

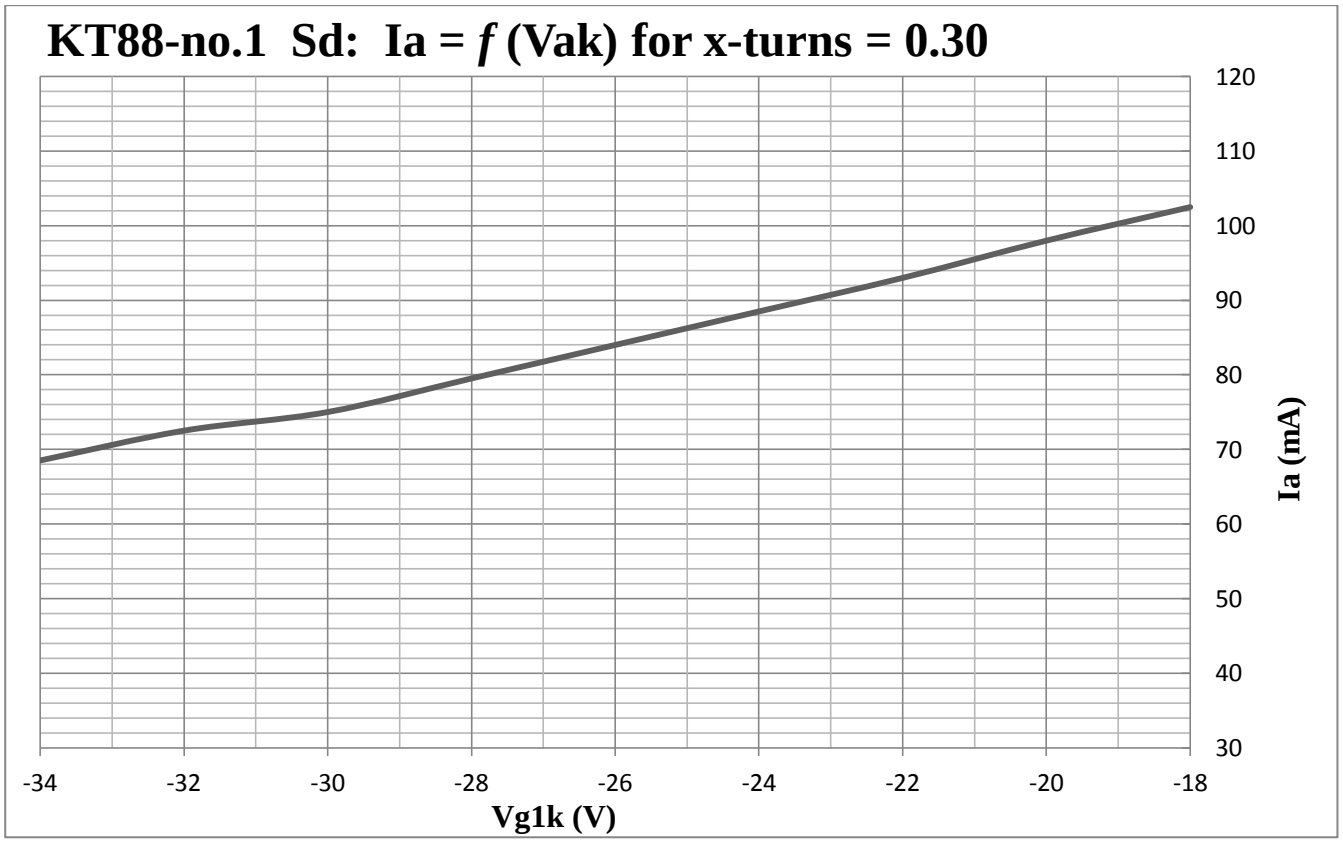


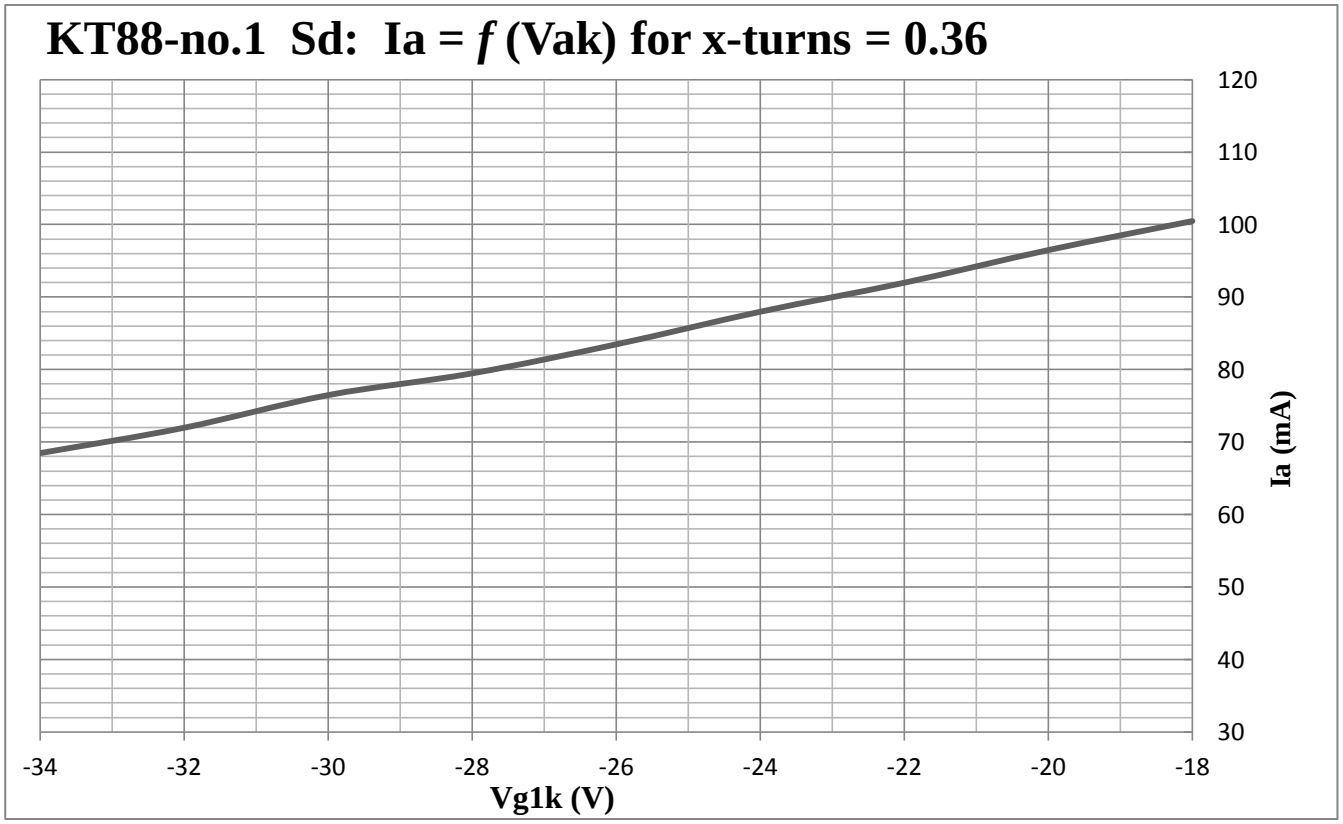


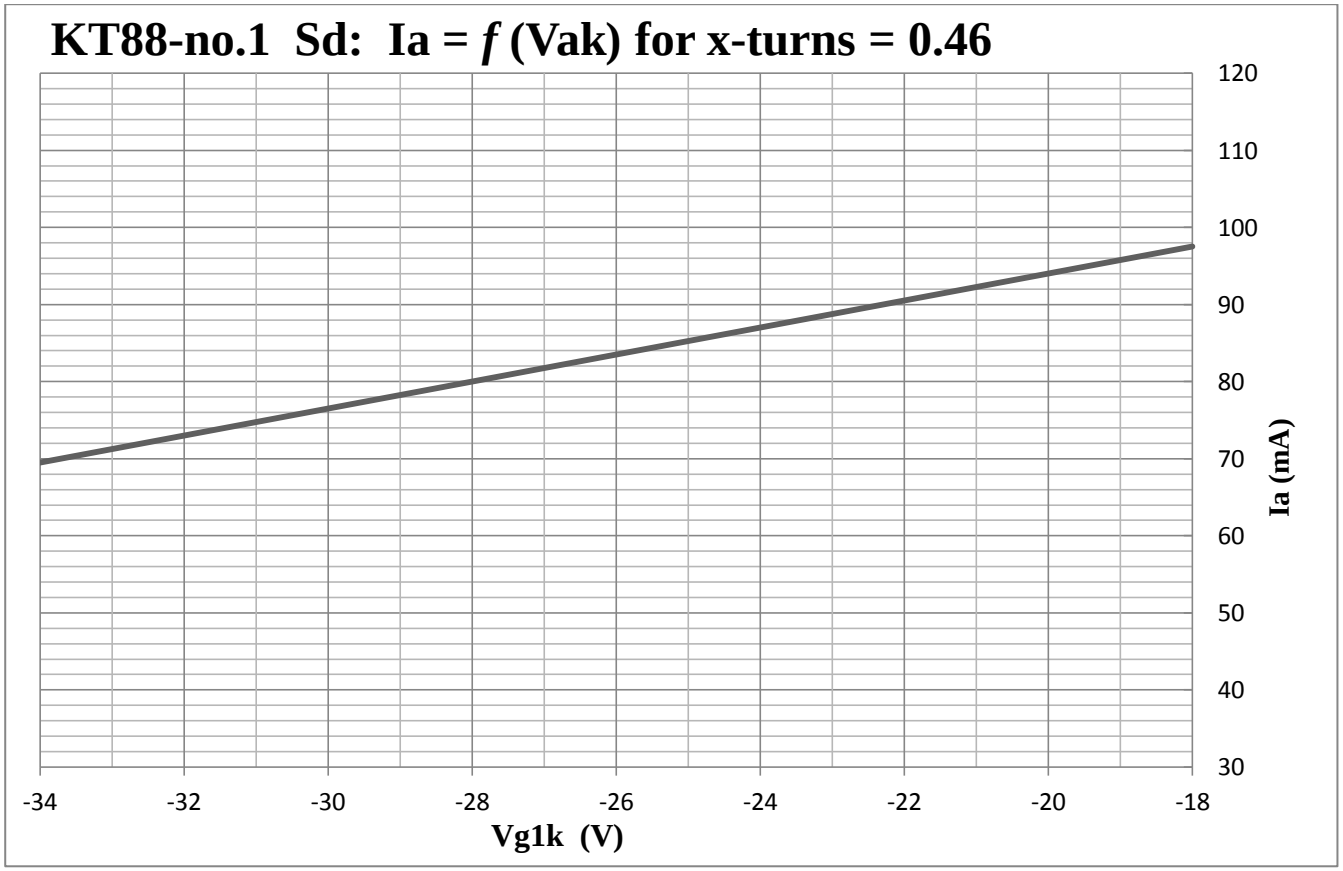

KT88-no.1 Sd: Ia = f (Vak) for x-turns = 0.11
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-34
-32
-30
-28
-26
-24
-22
-20
-18
Vg1k (V)

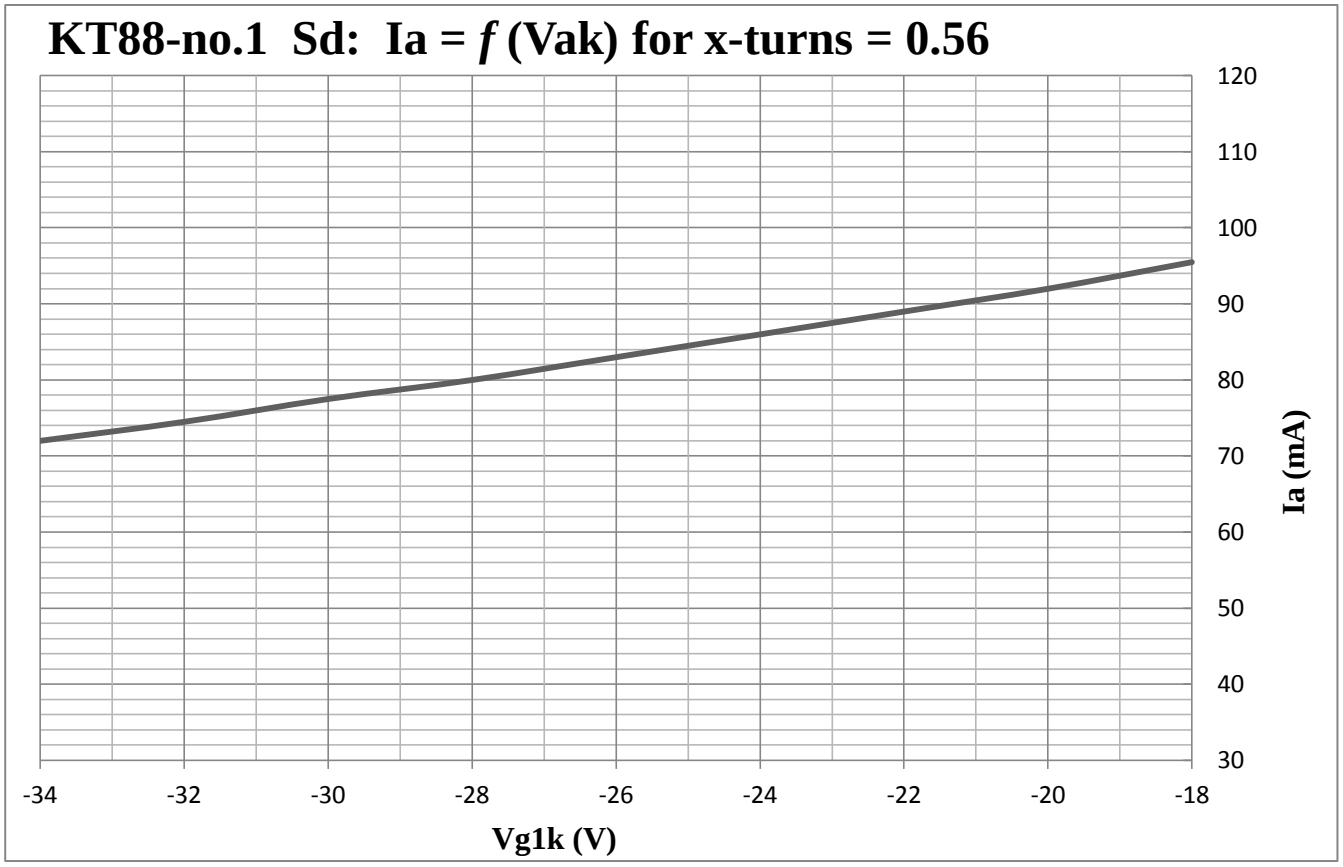

KT88-no.1 Sd: Ia = f (Vak) for x-turns = 0.17
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-34
-32
-30
-28
-26
-24
-22
-20
-18
Vg1k (V)

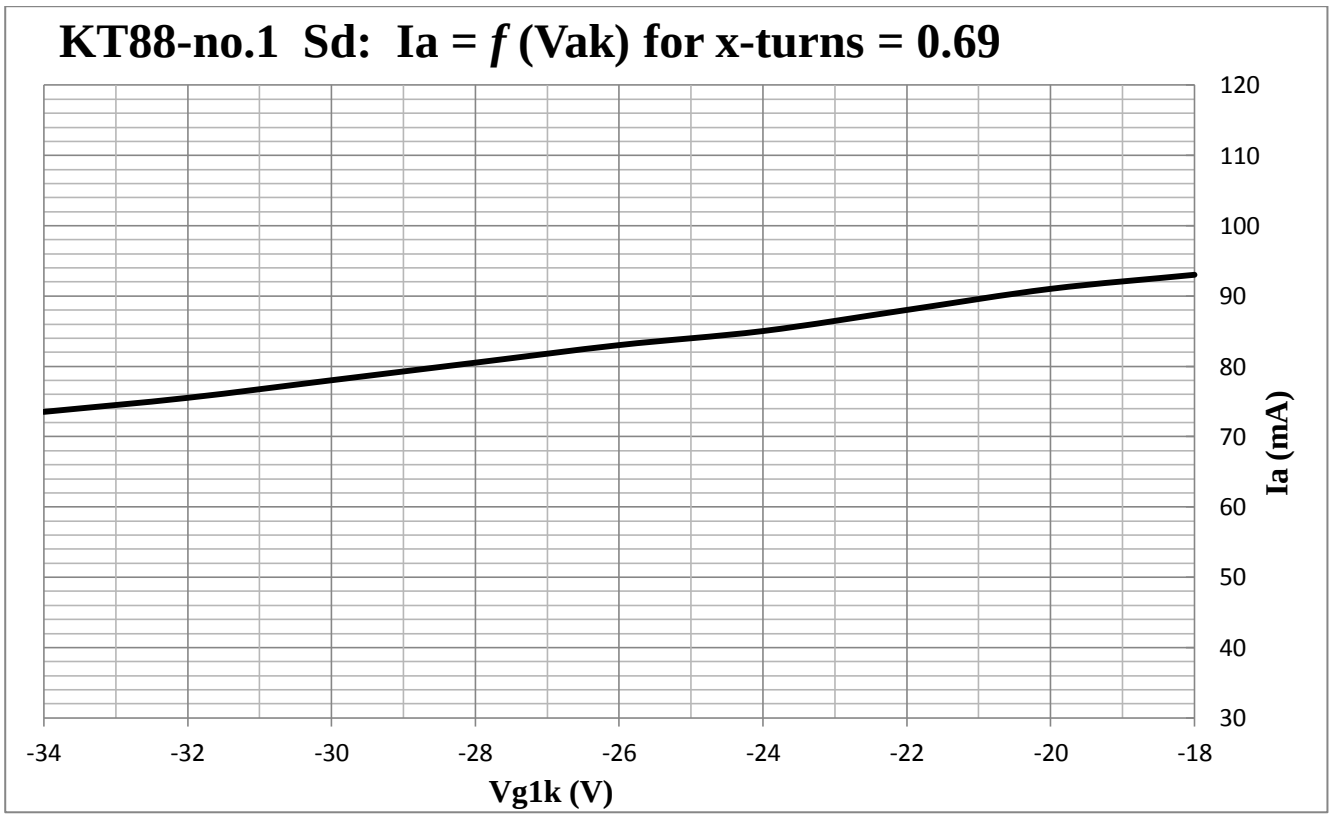

KT88-no.1 Sd: Ia = f (Vak) for x-turns = 0.23
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-34
-32
-30
-28
-26
-24
-22
-20
-18
Vg1k (V)

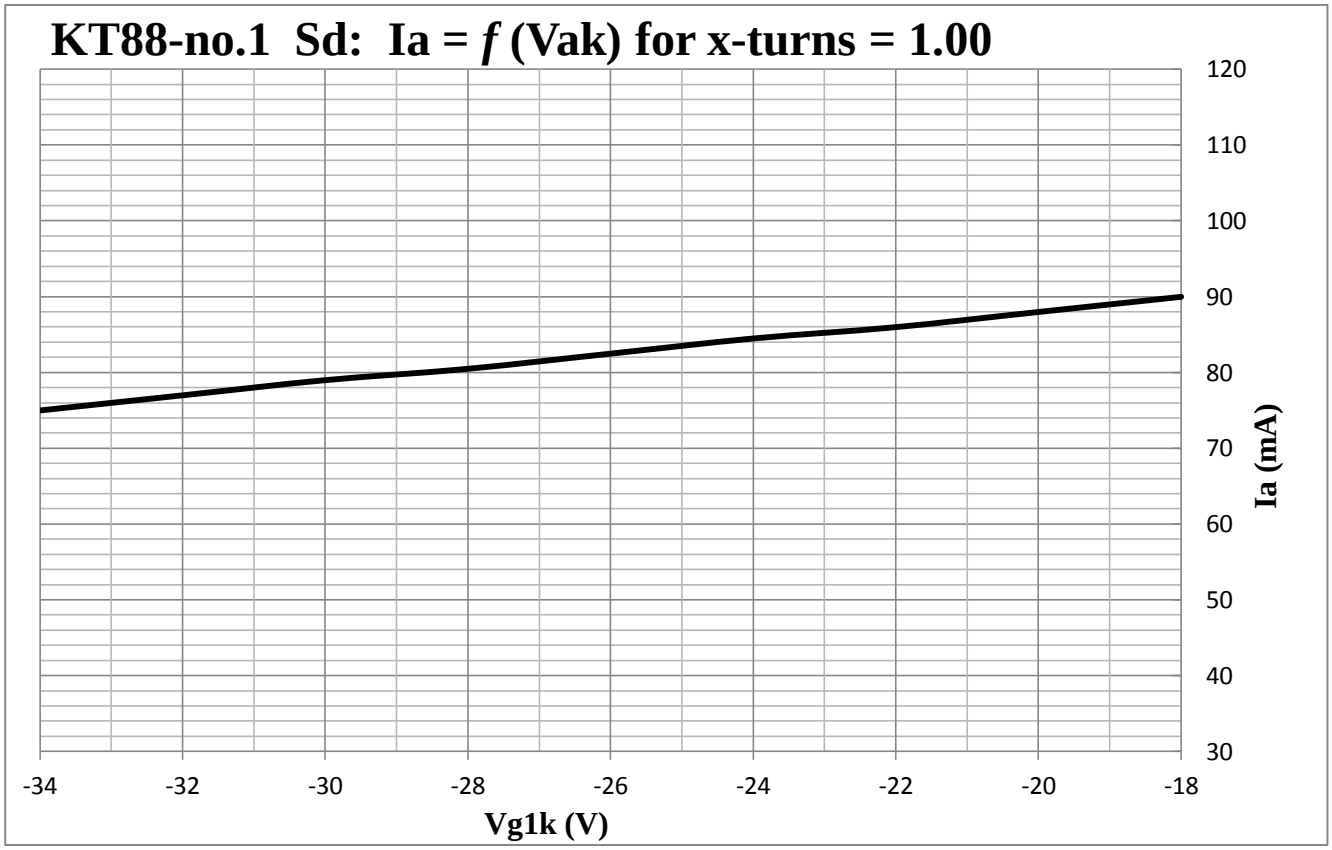

KT88-no.1 Sd: Ia = f (Vak) for x-turns = 0.30
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-34
-32
-30
-28
-26
-24
-22
-20
-18
Vg1k (V)


KT88-no.1 Sd: Ia = f (Vak) for x-turns = 0.36
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-34
-32
-30
-28
-26
-24
-22
-20
-18
Vg1k (V)


KT88-no.1 Sd: Ia = f (Vak) for x-turns = 0.46
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-34
-32
-30
-28
-26
-24
-22
-20
-18
Vg1k (V)


KT88-no.1 Sd: Ia = f (Vak) for x-turns = 0.56
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-34
-32
-30
-28
-26
-24
-22
-20
-18
Vg1k (V)


KT88-no.1 Sd: Ia = f (Vak) for x-turns = 0.69
120
110
100
90
80
70
60
50
40
30
Ia (mA)
-34
-32
-30
-28
-26
-24
-22
-20
-18
Vg1k (V)



And finally all these S_d together in one transconductance characteristic.