AMPEREX TUBE TYPE 6BQ5/EL84

The 6BQ5/EL84 is an output pentode designed for application in medium power Hi-Fi amplifiers. A pair of tubes in Class AB, push-pull conventional operation yields an output of up to 17 watts at 4% distortion (without feedback). In single-ended operation a power output of 5.7 watts can be obtained.

The true pentode characteristics of this tube reduce distortion at low instantaneous plate voltages which allow larger A.C. swings and increased undistorted output as compared with beam power tubes in the same power class.

GENERAL CHARACTERISTICS

ELECTRICAL

Cathode	coated unipotential
Heater Voltage	6.3 volts
Heater Current	0.76 amps.
Direct Interelectrode Capacitances	
Grid No. 1 to all elements except plate	10.8 $\mu\mu$f
Plate to all other elements except Grid No. 1	6.5 $\mu\mu$f
Plate to Grid No. 1	0.5 $\mu\mu$f
Grid No. 1 to heater	0.25 $\mu\mu$f
Characteristics	
Plate Voltage	250 volts
Grid No. 2 Voltage	250 volts
Plate Current	48 mA
Grid No. 2 Current	5.5 mA
Grid No. 1 Voltage	− 7.3 volts
Transconductance	11,300 micromhos
Plate Resistance	40 KΩ
Amplification Factor (Grid No. 1 to Grid No. 2)	19.5

MECHANICAL

Base	Small button, 9 pin, RETMA #9CV
Max. Overall Length	3 1/16 inches
Max. Seated Height	2 13/16 inches
Max. Diameter	7/8 inches
Mounting Position	any

MAXIMUM RATINGS (Design Center Values)

Plate Voltage	300 volts
Plate Dissipation	12 watts
Grid No. 2 Voltage	300 volts
Grid No. 2 Dissipation (zero signal)	2.0 watts
Grid No. 2 Dissipation (max. signal)	4.0 watts
Cathode Current	65 mA
Grid Resistance (cathode bias)	1.0 MΩ
Grid Resistance (fixed bias)	300 KΩ
Filament to Cathode Voltage	100 volts

6BQ5/EL84

Operating Conditions - Class A - One Tube

Plate Voltage	250	250	250	250 volts
→ Screen Grid Voltage	250	250	250	210 volts
Plate Load Resistance	5.2	4.5	7.0	7.0 KΩ
Cathode Resistance	135	135	210	160 Ω
Grid No. 1 Voltage	−7.3	−7.3	−8.4	−6.4 volts
Plate Current (zero signal)	48	48	36	36 mA
Plate Current (max. signal)	49.5	50.6	36.8	36.6 mA
Grid No. 2 Current (zero signal)	5.5	5.5	4.1	3.9 mA
Grid No. 2 Current (max. signal)	10.8	10.0	8.5	7.3 mA
Input (rms) Signal Voltage	4.3	4.4	3.5	3.4 volts rms.
Power Output	5.7	5.7	4.2	4.3 watts
Total Distortion (measured with fixed grid bias)	10	10	10	10 %

Operating Conditions - Class AB - Two Tubes, Push-Pull

Plate Voltage	250	300 volts
Grid No. 2 Voltage	250	300 volts
Common Cathode Resistance	130	130 Ω
Plate to Plate Load Resistance	8.0	8.0 KΩ
Plate Current (zero signal)	2x31	2x36 mA
Plate Current (max. signal)	2x37.5	2x46 mA
Grid No. 2 Current (zero signal)	2x3.5	2x4.0 mA
Grid No. 2 Current (max. signal)	2x7.5	2x11 mA
Input Signal Voltage (rms)	8	10 volts
Power Output	11	17 watts
Percent Distortion	3.0	4.0 %

Operating Conditions - Class B - Two Tubes, Push-Pull

Plate Voltage	250	300 volts
Grid No. 2 Voltage	250	300 volts
→ Grid No. 1 Voltage	−11.6	−14.7 volts
Plate to Plate Load Resistance	8.0	8.0 KΩ
Plate Current (zero signal)	2x10	2x7.5 mA
Plate Current (max. signal)	2x37.5	2x46 mA
Grid No. 2 Current (zero signal)	2x1.1	2x0.8 mA
Grid No. 2 Current (max. signal)	2x7.5	2x11 mA
Input Signal Voltage (rms)	8	10 volts (rms)
Power Output	11	17 watts
Percent Distortion	3.0	4.0 %

6BQ5/EL84

Class A - Triode Operation

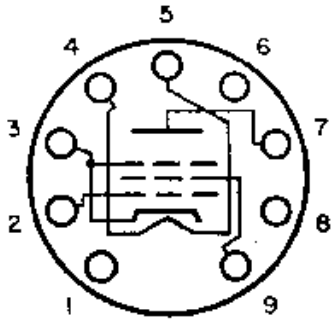
(Screen grid connected to plate)

Plate Voltage	250 volts
Common Cathode Resistance	270 Ω
Plate Load Resistance	3.5 KΩ
Plate Current (zero signal)	34 mA
Plate Current (max. signal)	36 mA
Input Signal Voltage (rms)	6.7 volts (rms)
Power Output	1.95 watts
Percent Distortion	9.0 %

Class AB - Triode Operation

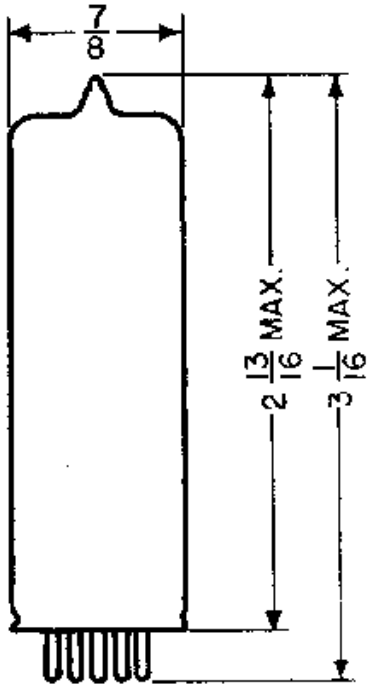
(Two tubes, push-pull. Screen grid connected to plate)

Plate Voltage	250	300 volts
Common Cathode Resistance	270	270 Ω
Plate to Plate Load Resistance	10	10 KΩ
Plate Current (zero signal)	2x20	2x24 mA
Plate Current (max. signal)	2x21.7	2x26.0 mA
Input Signal Voltage (rms)	8.3	10 volts (rms)
Power Output	3.4	5.2 watts
Percent Distortion	2.5	2.5 %

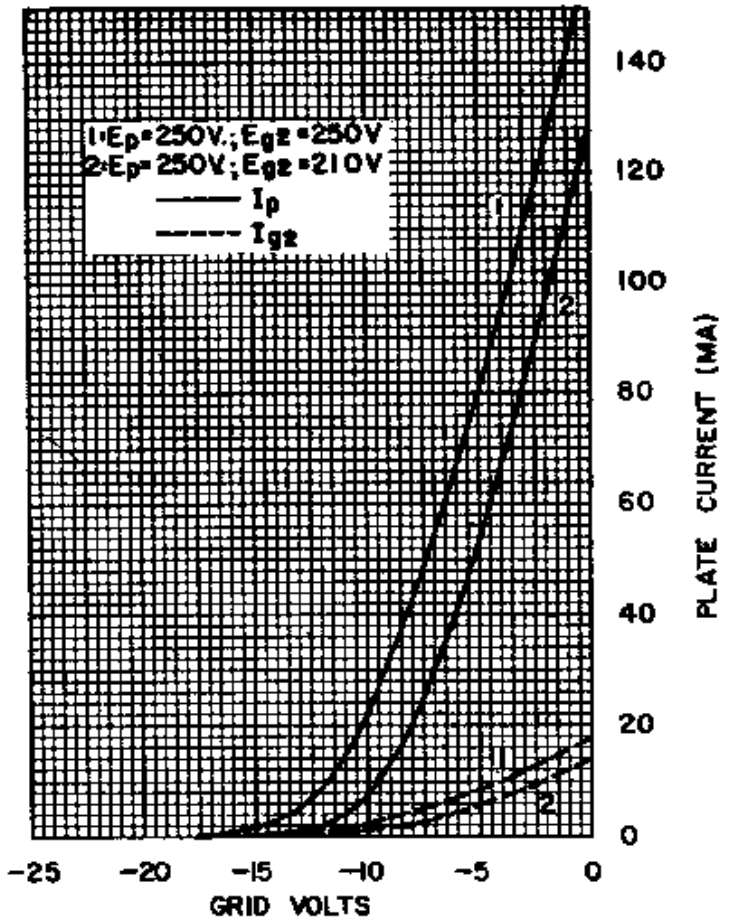


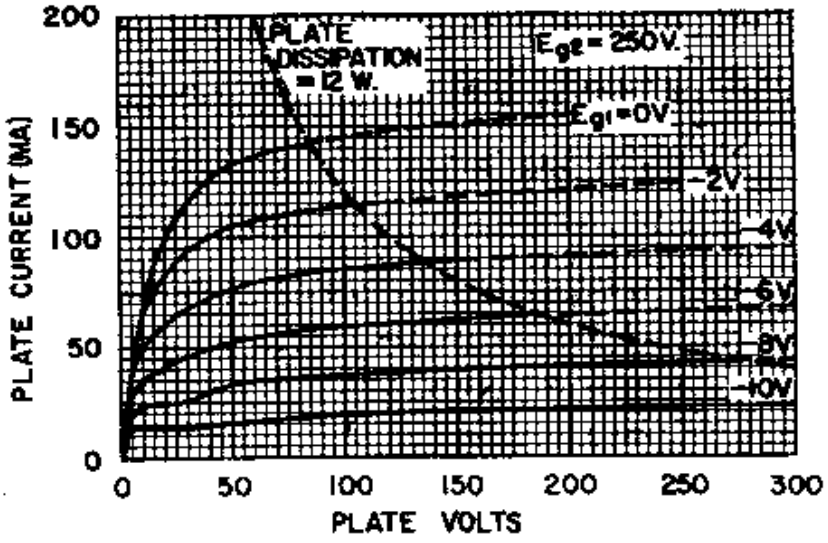
PIN CONNECTIONS

PIN. NO.	ELEMENT
1. —	INTERNALLY CONNECTED
2. —	GRID NO. 1.
3. —	CATHODE AND GRID NO. 3.
4. —	FILAMENT
5. —	FILAMENT
6 —	INTERNALLY CONNECTED
7. —	ANODE
8. —	INTERNALLY CONNECTED
9. —	GRID NO. 2.



6BQ5/EL84


1-Ep=250V.; Egz=250V
2-Ep=250V; Egz=210V
Ip
Igz
140
120
100
80
60
40
20
0
PLATE CURRENT (MA)
-25
-20
-15
-10
-5
0
GRID VOLTS


200
150
100
50
0
PLATE CURRENT (MA)
PLATE DISSIPATION = 12 W.
Egz = 250V.
Eg1 = 0V.
-2V.
-4V.
-6V.
-8V.
-10V.
0
50
100
150
200
250
300
PLATE VOLTS

6BQ5/EL84

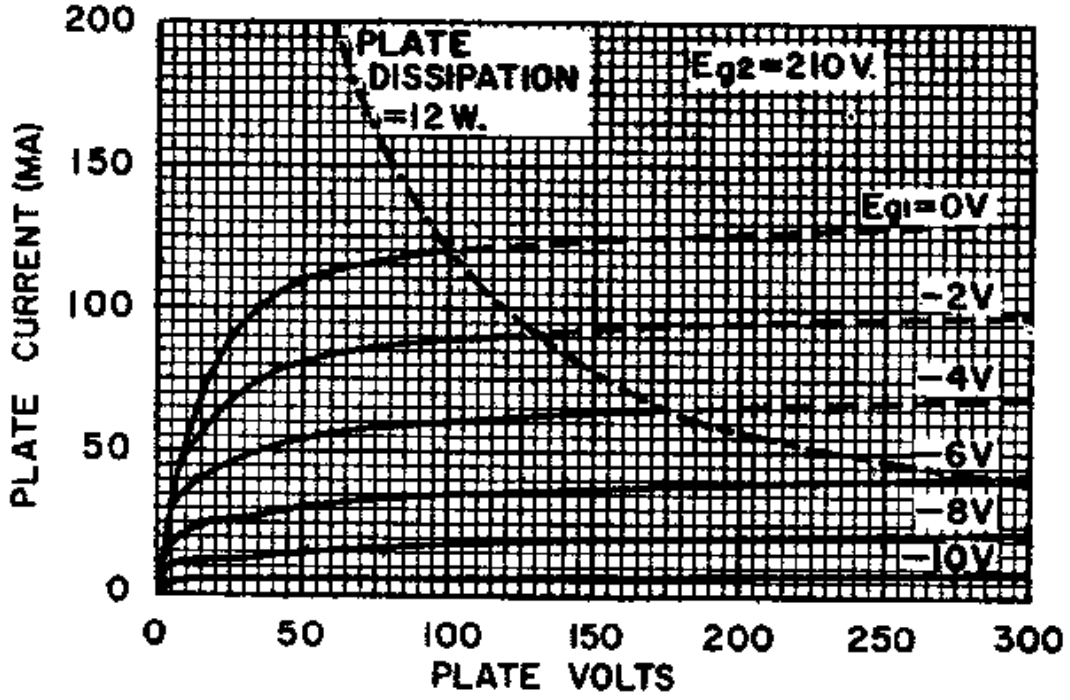
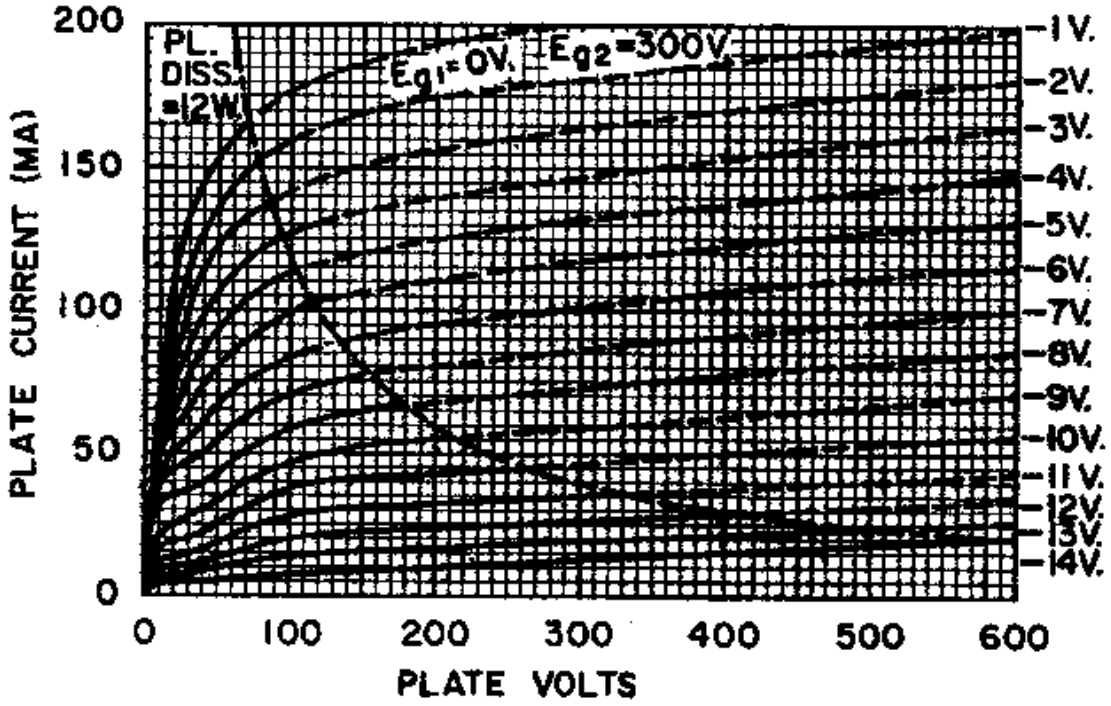
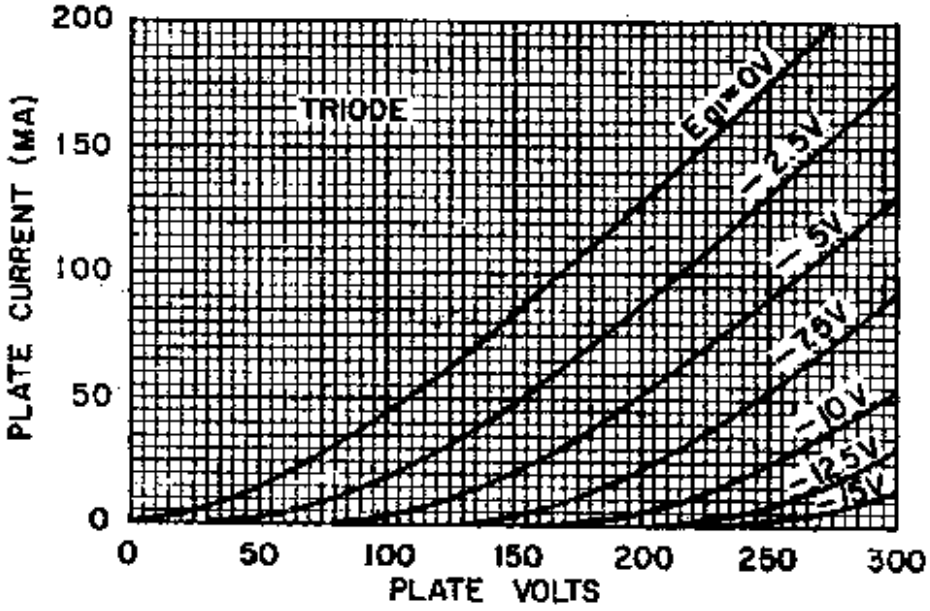
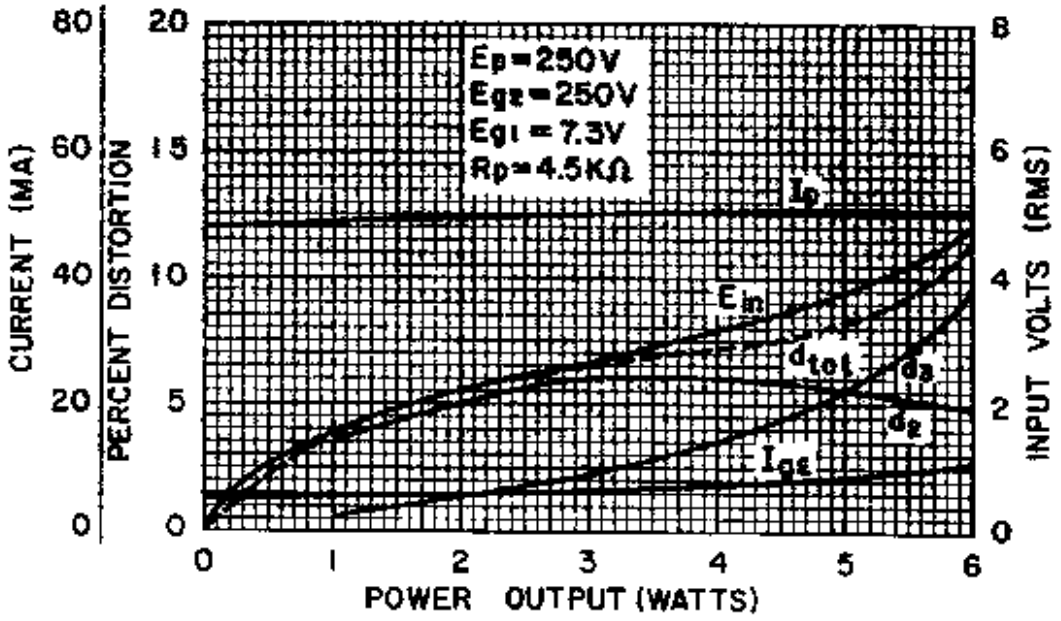


PLATE DISSIPATION =12 W.
Eg2=210 V.
Eg1=0V
-2V
-4V
-6V
-8V
-10V
PLATE CURRENT (MA)
200
150
100
50
0
0
50
100
150
200
250
300
PLATE VOLTS

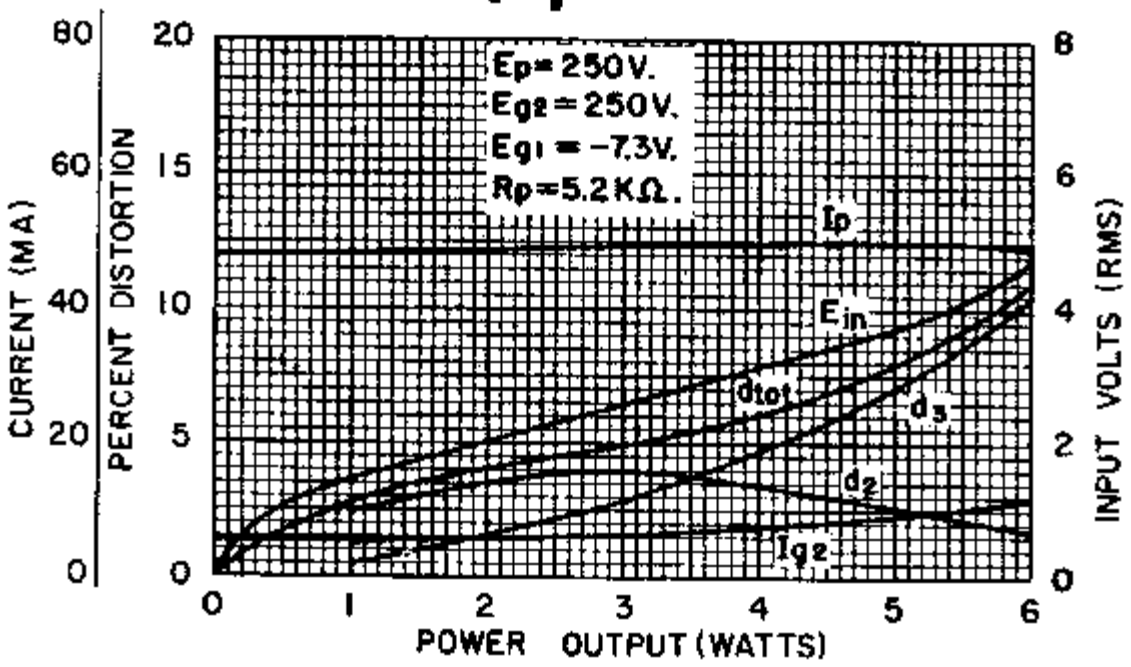

PL. DISS. =12W.
Eg1=0V.
Eg2=300V.
-1V.
-2V.
-3V.
-4V.
-5V.
-6V.
-7V.
-8V.
-9V.
-10V.
-11V.
-12V.
-13V.
-14V.
PLATE CURRENT (MA)
200
150
100
50
0
0
100
200
300
400
500
600
PLATE VOLTS

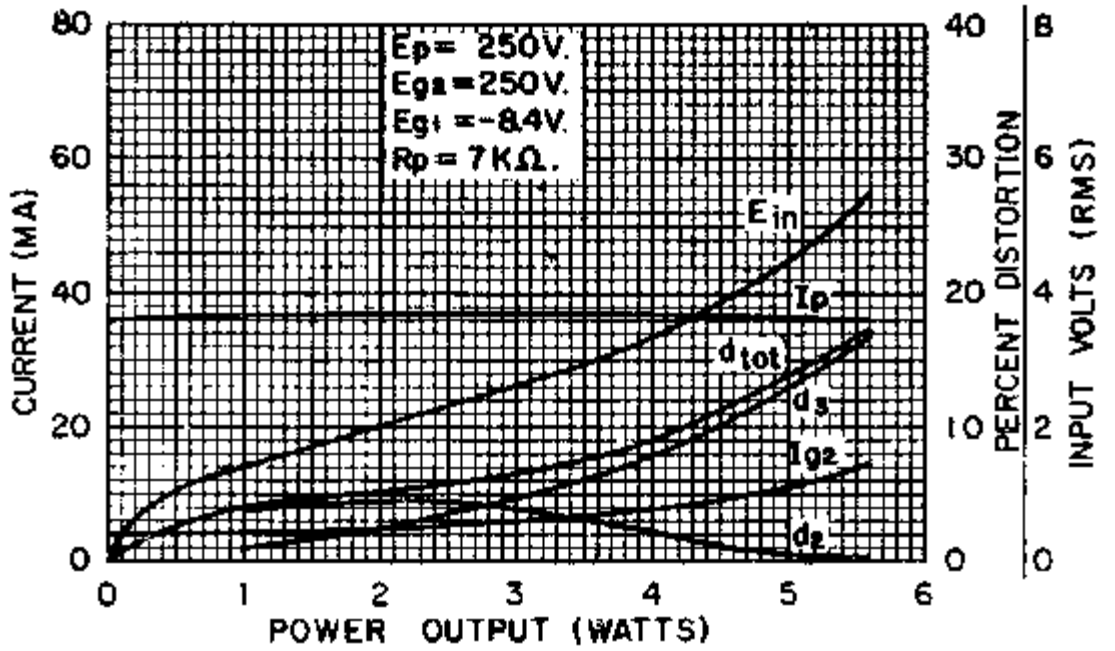
6BQ5/EL84


TRIODE
Eg1=0V
-2.5V
-5V
-7.5V
-10V
-12.5V
-15V
PLATE CURRENT (MA)
PLATE VOLTS
0
50
100
150
200
250
300

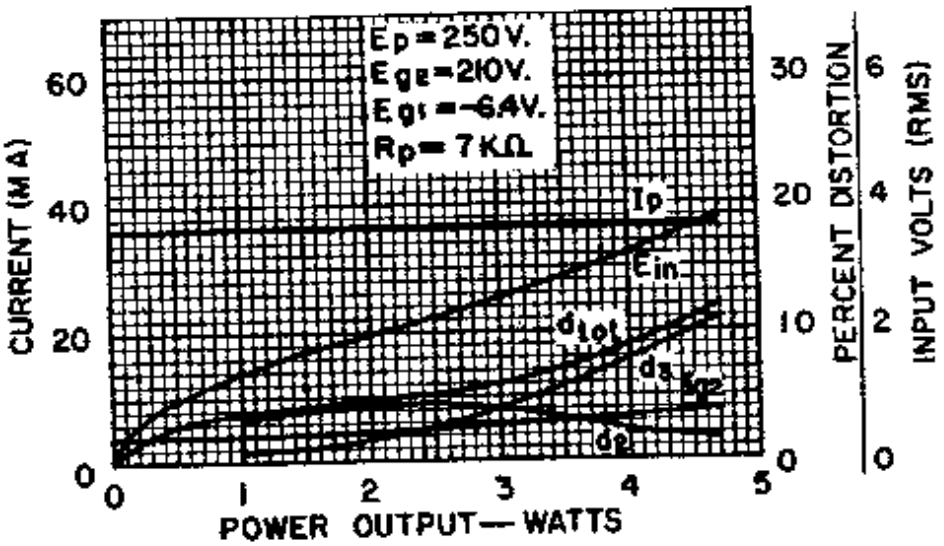

Ep=250V
Eg2=250V
Eg1=7.3V
Rp=4.5KΩ
Ip
Ein
dtot
d3
d2
Ig2
CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT (WATTS)

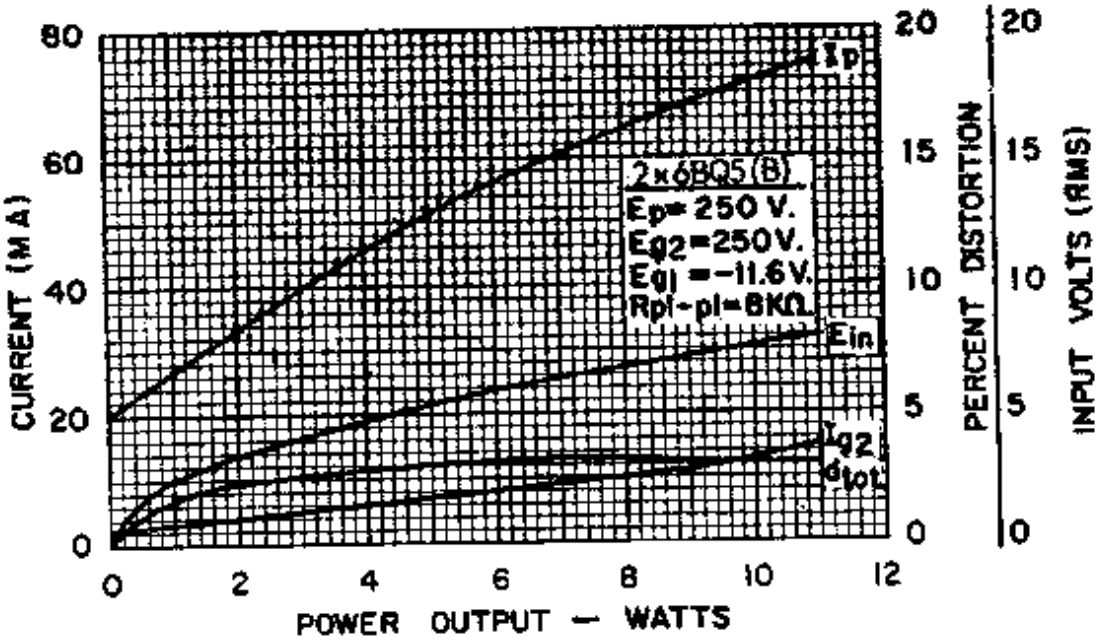
6BQ5/EL84


Ep= 250V.
Eg2 = 250V.
Eg1 = -7.3V.
Rp=5.2KΩ.
Ip
Ein
dtot
d3
d2
Ig2
CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT (WATTS)
0
20
40
60
80
5
10
15
1
2
3
4
6
8

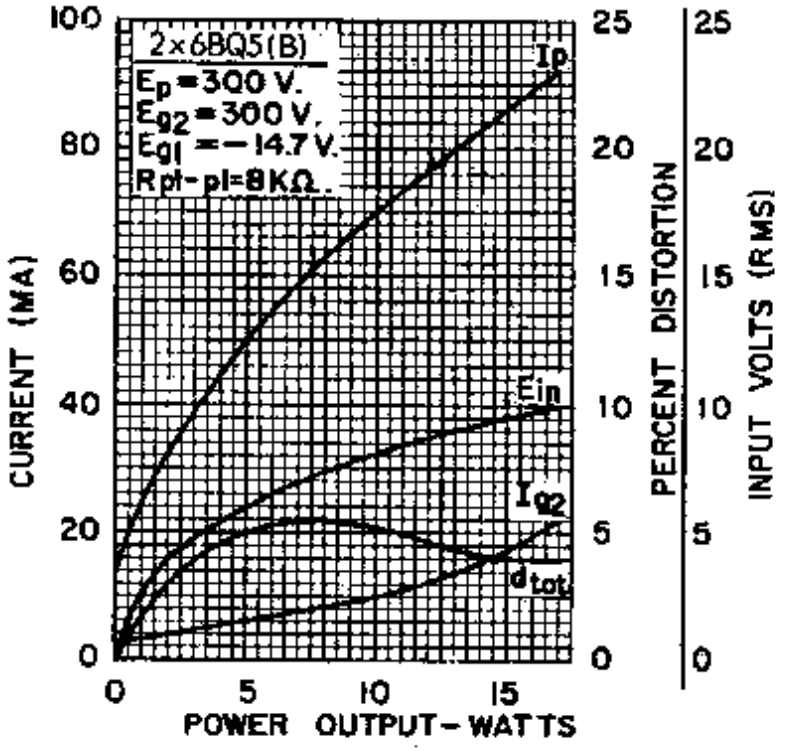

Ep= 250V.
Eg2 = 250V.
Eg1 = -8.4V.
Rp = 7KΩ.
Ein
Ip
dtot
d3
Ig2
d2
CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT (WATTS)
0
20
40
60
80
10
30
1
2
3
4
5
6
8

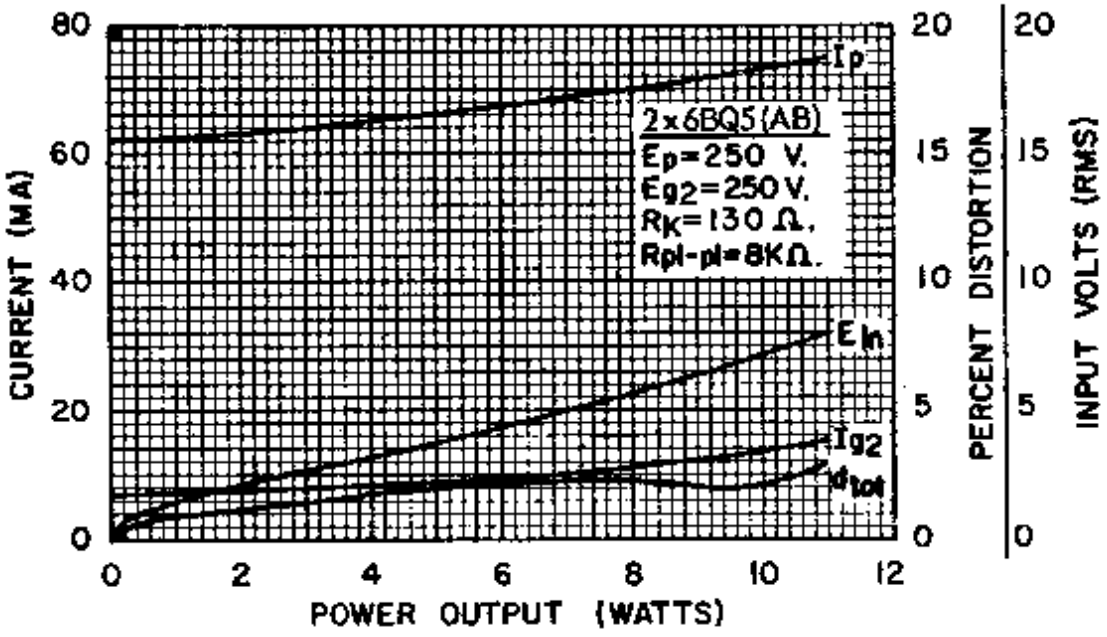
6BQ5/EL84


Ep = 250V.
Eg2 = 210V.
Eg1 = -6.4V.
Rp = 7 KΩ.
Ip
Ein
dtot
d3
d2
CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT — WATTS
0
20
40
60
10
30
2
4
6
1
2
3
4
5

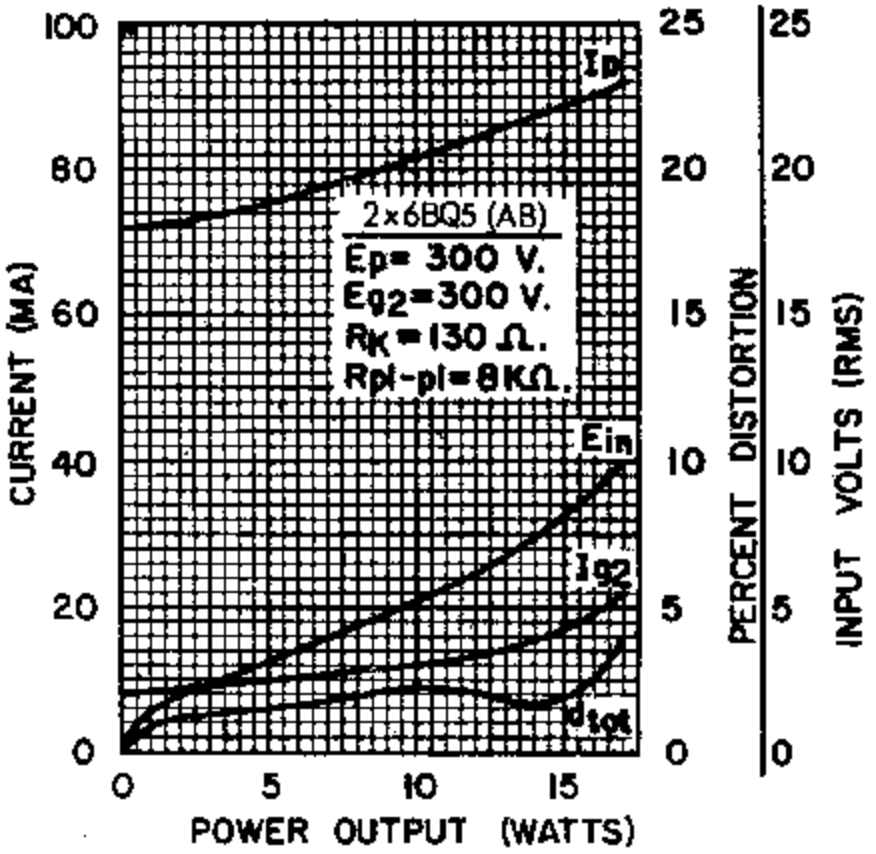

2 x 6BQ5 (B)
Ep = 250 V.
Eg2 = 250V.
Eg1 = -11.6V.
Rp-p = 8KΩ.
Ip
Ein
Ig2
dtot
CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT — WATTS
0
20
40
60
80
5
10
15
20
2
4
6
8
10
12

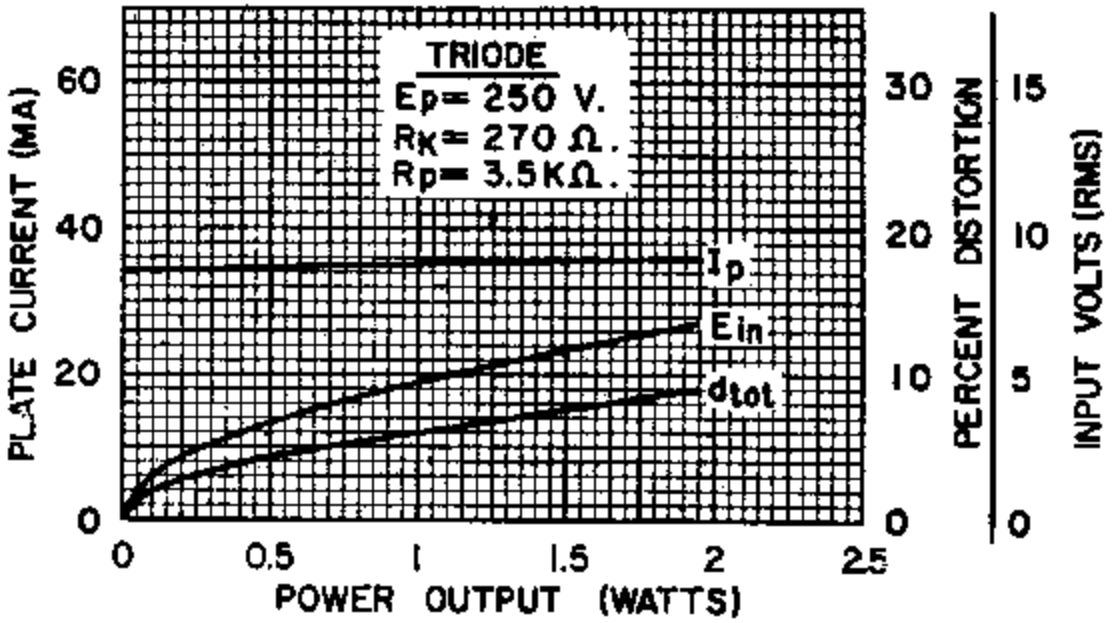
6BQ5/EL84


2×6BQ5(B)
Ep=300 V.
Eg2=300 V.
Eg1=−14.7 V.
Rpt-pt=8KΩ.
Ip
Ein
Ig2
dtot
CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT-WATTS
0
5
10
15
20
40
60
80
100
25

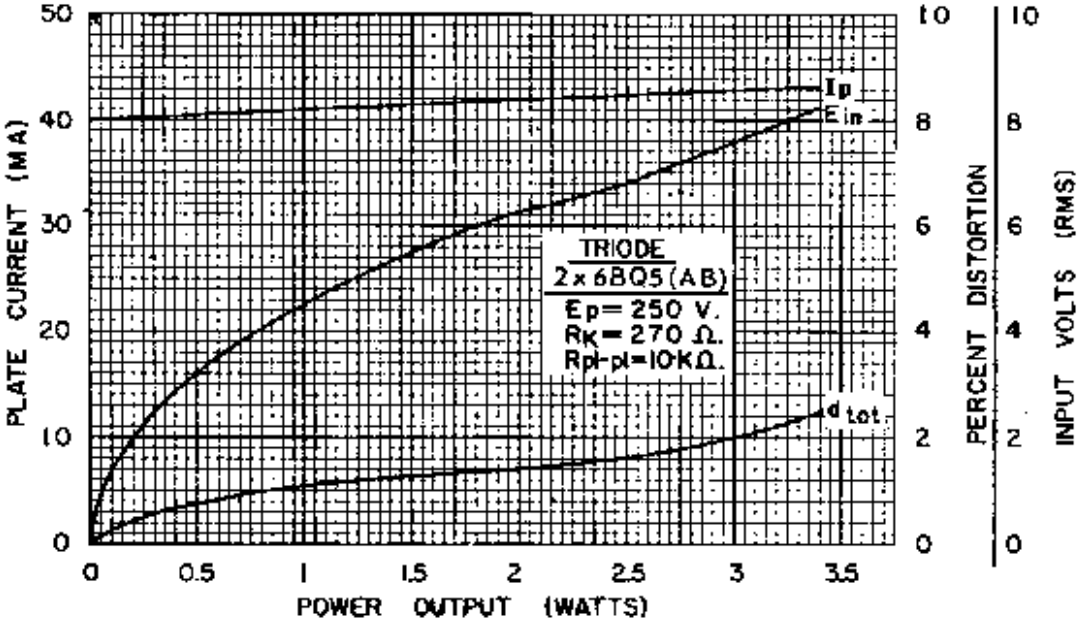

2×6BQ5(AB)
Ep=250 V.
Eg2=250 V.
RK=130 Ω.
Rpl-pl=8KΩ.
Ip
Ein
Ig2
dtot
CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT (WATTS)
0
2
4
6
8
10
12
20
40
60
80
15

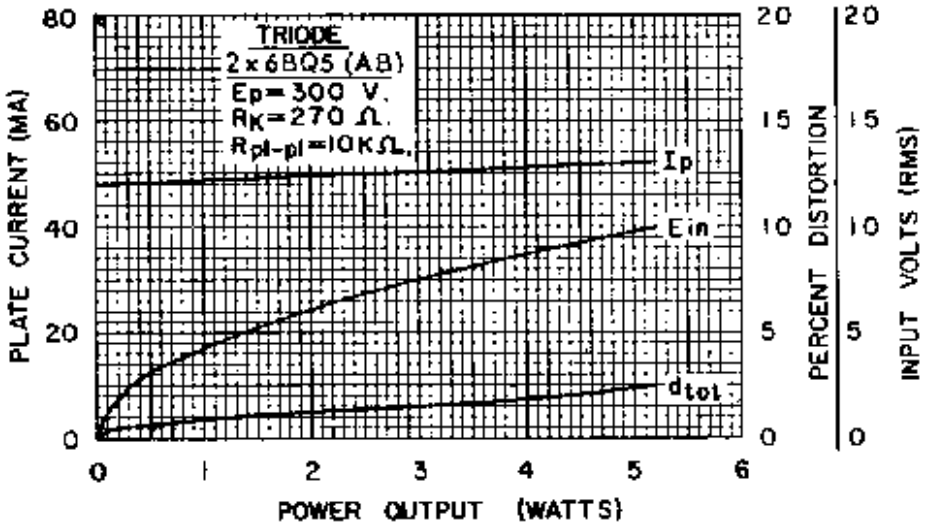
6BQ5/EL84


2×6BQ5 (AB)
Ep= 300 V.
Eg2=300 V.
Rk=130 Ω.
Rpl-pl=8KΩ.
Ip
Ein
Ig2
dtot
CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT (WATTS)
0
20
40
60
80
100
0
5
10
15
20
25
0
5
10
15
20
25


TRIODE
Ep= 250 V.
Rk= 270 Ω.
Rp= 3.5KΩ.
Ip
Ein
dtot
PLATE CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT (WATTS)
0
20
40
60
0
0.5
1
1.5
2
2.5
0
10
20
30
0
5
10
15

6BQ5/EL84


TRIODE
2 x 6BQ5 (AB)
Ep = 250 V.
RK = 270 Ω.
Rpl-pl = 10KΩ.
Ip
Ein
dtot.
PLATE CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT (WATTS)
0
10
20
30
40
50
0
2
4
6
8
10
0
0.5
1
1.5
2
2.5
3
3.5


TRIODE
2 x 6BQ5 (AB)
Ep = 300 V.
RK = 270 Ω.
Rpl-pl = 10KΩ.
Ip
Ein
dtot.
PLATE CURRENT (MA)
PERCENT DISTORTION
INPUT VOLTS (RMS)
POWER OUTPUT (WATTS)
0
20
40
60
80
0
5
10
15
20
0
1
2
3
4
5
6